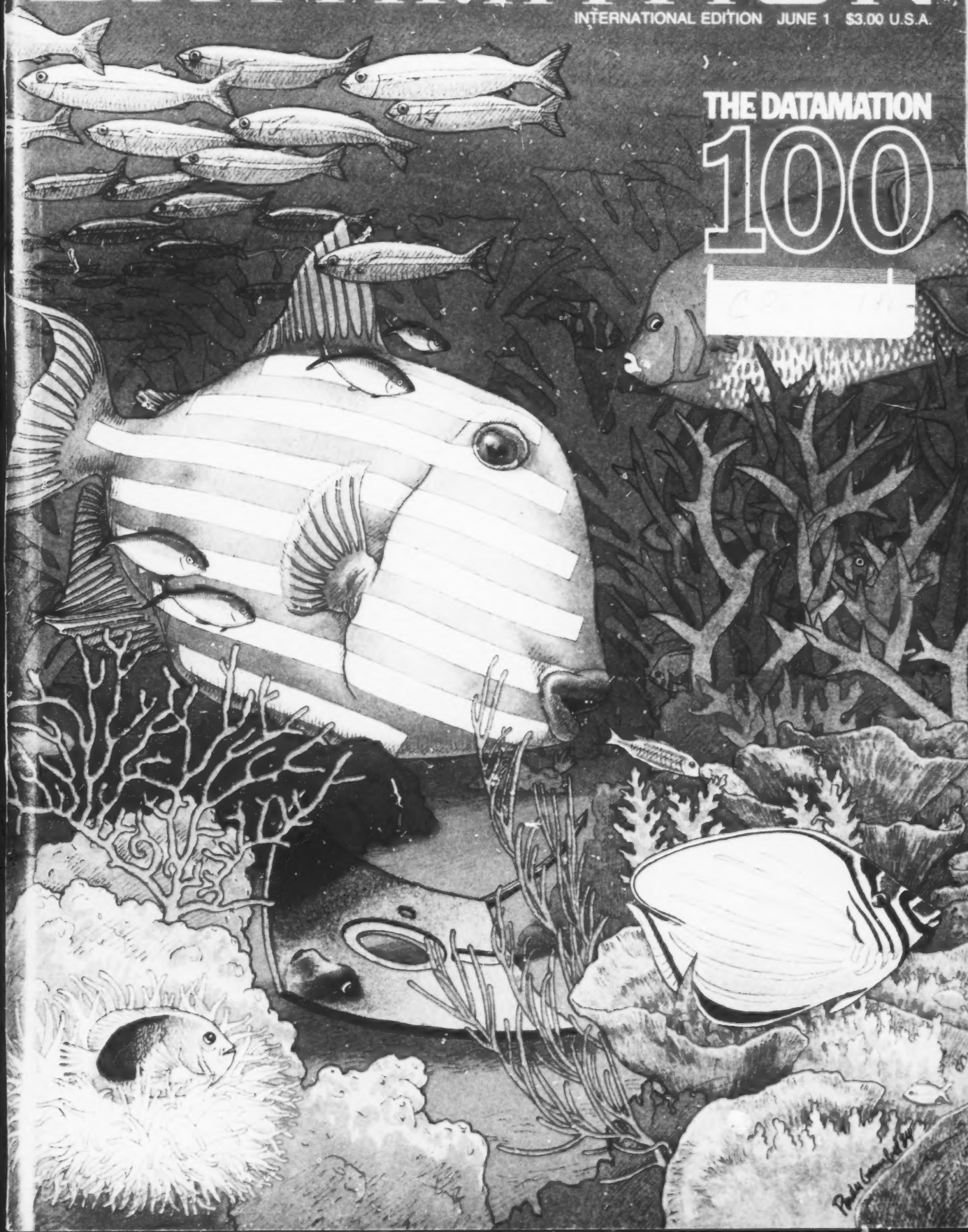


DATAMATION⁸⁴

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THE DATAMATION

100



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22 IN FOCUS

Money will not buy a local election, but it is the cost of admission, and microcomputers supply the tickets. "The New Political Machine," says Rodney N. Smith, is managing the money, setting up the schedules, and mailing the propaganda in current campaigns.

52 THE DATAMATION 100: FATHOMING THE INDUSTRY

Pamela Archbold

Revenues for the Top 100 companies grew 18% to \$91.8 billion in 1983, as all but two dozen of the firms reported earnings gains. Increased sales, combined with belt-tightening in personnel and R&D, seemed to be important in shaking off the effects of the recession.

60 RANKING OF THE TOP 100

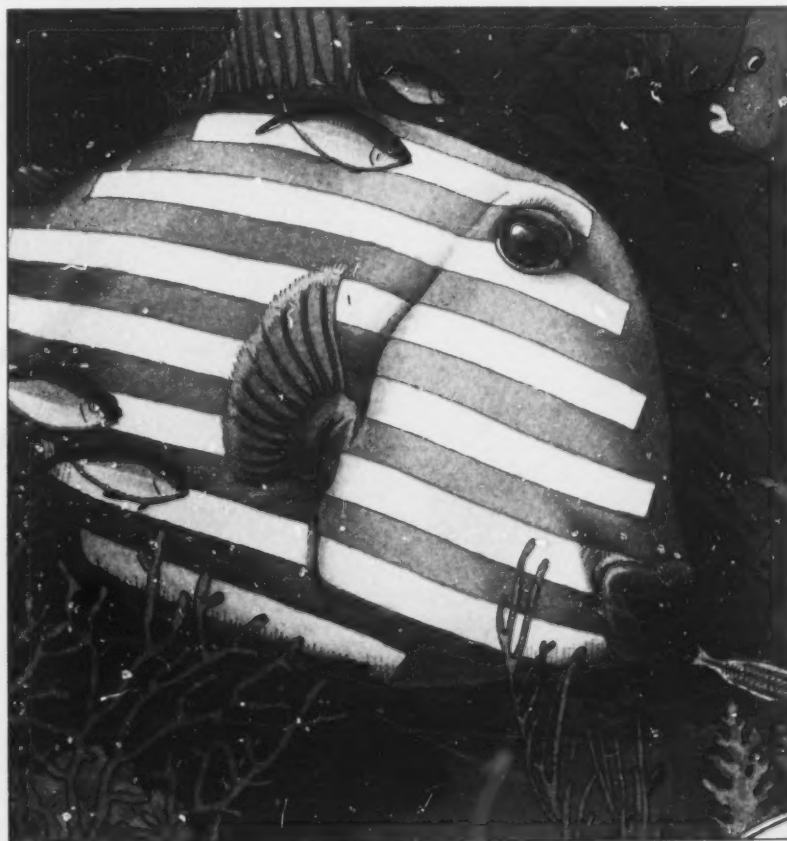
The 10 companies that topped the list last year did it again, and in exactly the same order, except for Wang and Honeywell, which switched positions.

66 COMPANY PROFILES

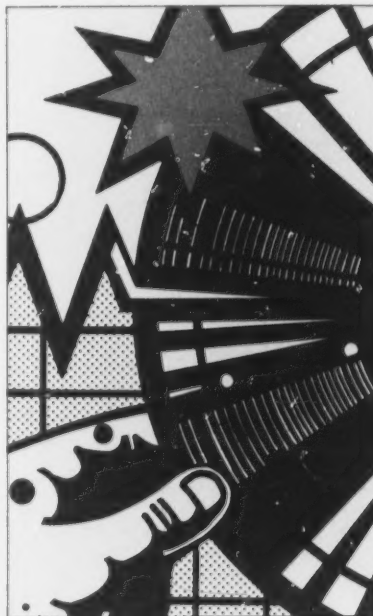
Incisive sketches of each of the Top 100 companies, with analyses of their pasts, their potentials, their products, and their problems.

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Bruce C. Kulia, donning (and losing) his detective's hat, admits that when it comes to sleuthing out a software scam, "My Skull is Thick." Roy Mengot provides another window into the computer with *Digits*.



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COVER SCULPTURE BY KATHY JEFFERS/
PHOTOGRAPH BY WALTER WICK

FATHOMING THE INDUSTRY

by Pamela Archbold

The data processing industry burst through the surface of the recession, with revenues up and earnings advancing swimmingly in 1983. Total revenues for the DATAMATION 100 companies increased 18% to \$91.8 billion. As for profits, the economic recovery also brought a brighter glow to the ledgers—only two dozen companies showed earnings declines in 1983, compared to double that number for the prior year. The improvement in bottom lines came as a result of cost-cutting as well as increased sales.

The industry learned during the recession that lean was as important as mean. Few companies allowed employment to grow significantly and few companies increased research and development expenses lavishly. Another lesson can be seen in the growth in the number and size of niche companies supplying a few high-volume components or focusing on large end-user markets. Some of the largest percentage performance increases in DATAMATION 100 companies were posted by the niche players.

To qualify for the DATAMATION 100 a company needed data processing revenues of at least \$94.5 million, up 27% from the prior year's minimum of \$74.3 million (see Methodology, p. 57). The largest company, of course, is IBM, with \$35.6 billion in dp revenues, showing a renewed growth rate and displaying the aggres-

ILLUSTRATION BY PONDER GOEMBEL

Revenues and profits rebounded after the recession, but a shakeout looms.

siveness of a company a fraction its size. Again in second place is Digital Equipment with \$4.8 billion in dp revenues.

A number of companies made their first appearance in the DATAMATION 100 in 1983. Included in this group are PBX and terminal maker Mitel, at number 49. Intel, known primarily as a chip maker, has developed a budding dp business, and made it to the list at number 66. Cullinet profited from the increased need for micro-to-mainframe links and entered the Datamation 100 at number 94. Other new entrants include Canada Systems Group, number 92; Docutel/Olivetti, number 96; and Mead Corp., number 100. Compaq, the portable personal computer maker, had the most startling growth of any dp company last year, starting 1983 with no revenues and ending up the year with sales of \$111.2 million; this record brought Compaq into the Top 100 at number 91.

Leaving the ranks of the leading dp companies were General Automation, Modular Computer, Anacomp, and Comshare. Lanier also leaves, as it was merged with Harris Corp. Tymshare's merger with McDonnell Douglas took place in 1984, so it's still included in 1983's rankings.

The results of the ninth annual DATAMATION survey of the domestic dp industry show a much healthier business than was the case in 1982, when 40 companies reported an earnings decline. In 1983 the number of companies with earnings declines shrank to 23, and many of these companies were conglomerates whose dp units fared fine while other business segments suffered. Among the members of this group are Allied Corp., General Electric, General Instrument, Gould, Schlumberger, and Signal Cos. Other companies, such as Apple, however, flourished on their dp efforts alone.

One sector of the hardware business suffered a public ordeal last year. Microcomputers cut into the sales of minicomputers, and price competition and widely publicized internal problems hurt Prime and DEC, as both were under earnings pressure. Other companies having difficulties included NBI, Paradyne, Management Assistance, Tektronix, and General Instrument. Everything from the collapse of the video game business to increased competitive pressure from IBM to government investigations affected this group. Check the profiles following this article for the gory details.

The number of companies reporting losses was high during 1982 but declined last year. During 1982 seven companies were in the red but in 1983 only five DATAMATION 100 companies lost money. AT&T, of course, was the big loser with its \$5 billion write-off for obsolete hardware as it entered the computer industry in a big way. StorageTek was also

FIG. 1

MAINFRAME REVENUES

(\$ MILLIONS)

RANK	COMPANY	1983 REVENUES (\$ MILLIONS)	1982 REVENUES (\$ MILLIONS)	% CHANGE
1	IBM	11,443.6	10,661.8	7.3
2	Burroughs Corp.	2,000.0	2,000.0	NM
3	Honeywell Inc.	1,020.1	1,060.0	-3.7
4	NCR Corp.	1,000.0	1,100.0	-9.0
5	Control Data Corp.	775.0	705.0	9.9
6	Sperry Corp.	700.0	728.8	-3.9
7	Amdahl Corp.	570.7	412.0	38.5
8	National Semiconductor	200.5	175.0	14.5
9	Cray Research Inc.	169.7	141.1	20.2

AVERAGE: 8.20

NM: not meaningful

FIG. 2

MINI REVENUES

RANK	COMPANY	1983 REVENUES (\$ MILLIONS)	1982 REVENUES (\$ MILLIONS)	% CHANGE
------	---------	-----------------------------------	-----------------------------------	----------

1	Digital Equipment Corp.	2,700.0	2,500.0	8.0
2	IBM	2,627.0	2,945.0	-10.7
3	Burroughs Corp.	950.0	900.0	5.5
4	Wang Laboratories Inc.	892.9	660.0	35.2
5	Hewlett-Packard Co.	736.3	655.0	12.4
6	Data General Corp.	705.0	670.0	5.2
7	Prime Computer Inc.	416.5	351.0	18.6
8	Tandem Computers Inc.	400.0	295.0	35.5
9	Gould Inc.	334.0	325.0	2.7
10	Honeywell Inc.	330.0	330.0	NM
11	Texas Instruments Inc.	310.0	300.0	3.3
12	Perkin-Elmer Corp.	225.0	205.2	9.6
13	Management Assistance	211.5	201.5	4.9
14	NCR Corp.	210.0	120.0	75.0
15	Mohawk Data Sciences Corp.	168.0	149.0	12.7

AVERAGE: 14.53

NM: not meaningful

pushed into the red by a big product write-off. In the doldrums for both years were Centronics and Tymshare. Docutel/Olivetti was in the red due to difficulties in its 1981 merger and weaknesses in its office automation product line.

RISE OF THE MICRO

No advance has changed the industry more than the microcomputer. This revolution continued during 1983 with the micro manufac-

Indeed, the rise of the microcomputer has been a two-edged sword for the \$92 billion-plus industry.

turers surging ahead in the Top 100 rankings. Apple Computer posted calendar 1983 revenues of \$1.08 billion, and reached number 11. Following closely behind were Tandy, with dp revenues of \$945 million, at number 13, and Commodore, at number 14, with revenues of \$926 million.

The growth of these companies and the other vendors with important micro lines effectively pushed the mini makers down on the DATAMATION 100 list.

The micro influence was felt throughout the entire industry because a new breed of company has evolved in the dp business, the

FIG. 3

MICRO REVENUES

RANK	COMPANY	1983 REVENUES (\$ MILLIONS)	1982 REVENUES (\$ MILLIONS)	% CHANGE
1	IBM	2,600.0	500.0	420.0
2	Apple Computer Inc.	1,084.7	664.0	63.3
3	Commodore	926.7	367.8	151.9
4	Tandy Corp.	598.0	466.2	28.2
5	Hewlett-Packard Co.	399.4	258.0	54.8
6	Digital Equipment Corp.	300.0	200.0	50.0
7	Texas Instruments Inc.	150.0	233.0	-35.6
8	Compaq Computer Corp.	111.2	NA	NM
9	Wang Laboratories Inc.	100.0	NA	NM
10	NCR Corp.	83.2	NA	NM

AVERAGE: 73.3

NM: not meaningful NA: not available

FIG. 4

OFFICE SYSTEMS REVENUES

RANK	COMPANY	1983 REVS (\$ MILLIONS)	1982 REVS (\$ MILLIONS)	% CHANGE
1	IBM	1,600.0	2,000.0	-20.0
2	Wang Laboratories Inc.	800.0	661.5	20.9
3	Motorola Inc.	287.8	274.9	4.6
4	Harris Corp.	275.0	241.2	14.0
5	Burroughs Corp.	250.0	200.0	25.0
6	Xerox Corp.	230.0	160.0	43.7
7	Digital Equipment Corp.	200.0	100.0	100.0
8	Exxon Office Systems Inc.	200.0	165.0	21.2
9	CPT Corp.	192.1	158.5	21.1
10	Phillips Info. Systems	175.0	176.0	-0.5
11	NBI Inc.	140.8	119.5	17.8
12	NCR Corp.	85.0	53.4	59.1

AVERAGE: 21.3

FIG. 5

DP EMPLOYMENT**THOSE WHO STAFFED UP**

RANK	COMPANY	1983 DP EMPL	1982 DP EMPL	% CHANGE
1	Compaq Computer Corp.	614	96	539.5
2	Seagate Technology	2,100	339	519.4
3	Convergent Technologies	1,000	450	122.2
4	Televideo Systems Inc.	867	491	76.5
5	Micom Systems Inc.	1,559	915	70.3
6	NEC Info. Systems	650	400	62.5
7	Verbatim Corp.	2,840	1,790	58.6
8	NBI Inc.	1,665	1,096	51.9
9	Cullinet Software Sys.	1,050	706	48.7
10	Mead Corp.	1,040	700	48.5

micro component supplier. Niche companies like Tandon, SCI, and Seagate specialize in one product, such as disk drives, and are able to achieve fast growth because of low production costs and the astounding demand for personal computing power. During 1983 these niche players were among the fastest growing firms (see Fig. 7, p. 56).

It can be said that IBM is a primary factor behind the growth of niche companies. When it found itself without a personal computer in 1981, Big Blue decided to get one in a hurry by taking off-the-shelf parts and hiring outside contractors like SCI for subassembly. IBM took a shortcut from its normal demanding route of vertical integration to take advantage of the market window. SCI is a prime example of a niche company making good. During 1981 it achieved \$15 million in dp sales, but by 1983 dp revenues had increased to \$225 million.

The IBM decision to outsource subassembly of a product line to make a faster entry into the desktop market was quickly expanded upon by the rest of the dp industry. Vendors caught short without a microcomputer or intelligent workstation product arrived en masse in Silicon Valley, looking for a supplier to private label a desktop system for them.

A prime beneficiary was Convergent Technologies. Seeing the success of Burroughs with its use of Convergent Technologies' workstation—about 46% of CT's \$164 million in revenues was from Burroughs—other mainframers and older dp vendors opted for using outside systems suppliers. Convergent added a number of new customers, as companies like TRW, Basic Four, Raytheon, Mohawk Data, AT&T, Prime, and NCR signed purchase orders.

While niches are becoming fashionable in manufacturing, one of the earliest dp niches faces extinction. Nothing seems to help the remote services industry maintain the torrid growth and earnings momentum of the past. It's no secret that the remote computer services industry has been heavily hit by microcomputers. This is evident in the DATAMATION 100 rankings. General Electric reports that its GEISCO division was off 8%, causing GE to decline from the number 13 spot to number 18. Computer Sciences dropped from 18 to 23, while EDS slipped from 21 to 24. Boeing was the only remote services company that was able to move up, going from number 55 in 1982 to number 48 in 1983. As mentioned above, both Anacom and Comshare declined in revenues and fell off the list.

The mainframe software companies, however, were booming, in part due to the rising demand from microcomputer owners. Management Science America moved up in

The microcomputer software companies exhibited strength, but did not keep pace with the micro hardware manufacturers.

the rankings due to the strength of its Peachtree Software Division. Cullinet joined the DATAMATION 100 for the first time.

While the micro software companies exhibited strength, they did not keep pace with the volume and revenue growth of the microcomputer hardware manufacturers and component suppliers. The revenues of Lotus, Microsoft, and VisiCorp were in the \$50 million range last year, which was only half the revenue of the company ranked lowest in the DATAMATION 100. The achievement of Lotus in selling \$50 million worth of its 1-2-3 integrated software package pales beside the \$111.2 million that Compaq racked up with its IBM-compatible portable. The widely predicted shakeout and consolidation of the micro software industry will undoubtedly put Lotus and other companies into the DATAMATION 100 next year.

MERGERS IN 1983

Consolidation in the rest of the industry continued as the pace of mergers and acquisitions quickened in 1983. The biggest merger was the \$275 million that Harris paid for Lanier. Martin Marietta Data Systems expanded its product line by buying Mathematica and its RAMIS database management system. McDonnell Douglas made two smaller acquisitions and early in 1984 succeeded in buying Tymshare.

A number of companies bought pieces of other companies: AT&T, for instance, purchased 25% of Olivetti. The big surprise of the year, however, was IBM's purchase of 20% blocks of stock in Intel and later Rolm, after its quickie relationship with Mitel. For a company that adhered to the not-invented-here syndrome, IBM's moves to buy into other companies to ensure itself of technology and expand its product line was a remarkable event.

For Intel, the IBM investment helped finance additional chip production, much of which would be sold to IBM. After many years of marketing a modest office PBX, IBM's interest in fleshing out its office automation product line led to Mitel first, but IBM abandoned the Canadian-based company when development problems slowed the introduction of Mitel's voice and data switch.

A number of companies sold operations during the year. Dyan was the biggest seller, picking up \$41 million when it sold half of its holdings in Seagate Technologies. A host of other micro companies actually went bankrupt or came close. While executives at Fortune Systems, Victor Technologies, and Vector Graphic all had aspirations of entering the Top 100 as 1983 dawned, by year-end their biggest dream was keeping their firms operating.

Concern about keeping costs under

FIG. 6

DP EMPLOYMENT

THE 10 WHO CUT THE MOST

RANK	COMPANY	1983 EMPL	1982 EMPL	% CHANGE
1	Tandon Corp.	1,700	2,500	-32.0
2	Harris Corp.	22,000	26,000	-15.3
3	Centronics Data	1,700	2,000	-15.0
4	Tektronix	20,605	22,924	-10.1
5	Planning Research	5,600	6,200	-9.6
6	National Data Corp.	2,253	2,458	-8.3
7	Tymshare	3,302	3,600	-8.2
8	Floating Point Systems	1,319	1,390	-5.1
9	McDonnell Douglas	7,177	7,500	-4.3
10	Diebold	5,824	6,051	-3.7

FIG. 7

THE WINNERS

RANK	COMPANY	1983 DP REVENUES (\$ MILLIONS)	1982 DP REVENUES (\$ MILLIONS)	% CHANGE
1	Compaq Computer Corp.	111.2	NA	NM
2	Seagate Technology	221.0	57.0	287.7
3	SCI Systems Inc.	225.0	80.0	181.2
4	Commodore	926.7	367.8	151.9
5	Tandon Corp.	343.9	177.1	94.1
6	Harris Corp.	580.0	332.5	74.4
7	Televideo Systems Inc.	168.7	98.5	71.2
8	Cullinet Software Systems Inc.	108.0	63.6	69.8
9	Convergent Technologies	163.5	96.5	69.4
10	Amdahl Corp.	777.7	462.2	68.2

NA: not available
NM: not meaningful

FIG. 8

THE LOSERS

RANK	COMPANY	1983 DP REVENUES (\$ MILLIONS)	1982 DP REVENUES (\$ MILLIONS)	% CHANGE
1	Storage Technology	886.6	1,079.2	-17.8
2	Signal Co.	160.0	177.3	-9.7
3	Texas Instruments Inc.	850.0	900.0	-5.5
4	General Electric	820.0	862.0	-4.8
5	Planning Research	135.6	138.4	-2.0
6	Philips Info. Systems	200.0	203.0	-1.4
7	Honeywell Inc.	1,666.1	1,684.7	-1.1
8	Sperry Corp.	2,799.6	2,802.9	-0.1

METHODOLOGY

Throughout the year, DATAMATION tracks over 175 companies on a worldwide basis. Our survey is meant to be used as a comparative analysis, and therefore all revenues and earnings figures have been adjusted to calendar year calculations. Because over half of the companies covered operate on a fiscal year that does not coincide with the calendar year, their revenues and earnings for purposes of this survey have been derived from quarterly reports. Numbers relating to R&D expenditures and total number of employees, however, are reported as of each company's fiscal year-end.

During 1983, a number of Top 100 companies restated their performance figures, whether to reflect changed accounting methods, mergers, spinoffs, or just plain errors in earlier reports. While each chart and table within the survey incorporates the restated numbers, we do not alter the prior year's ranking for the companies concerned even though in some cases the restatements would have moved a company up or down a few notches.

Also, please note that a company's internal sales, or sales made to other divi-

sions or units within the company, are excluded from the year's total dp revenues, as they are considered captive and not commercial sales.

For purposes of the survey, dp-related revenue is defined as general purpose dp products and services generated by one or more of the following categories of equipment: mainframes, minicomputers, microcomputers, office systems, data communications, peripherals and terminals, software and services, and maintenance and repair. Explicitly excluded are data transmission or "basic" services revenues from specialized common carriers; standalone electronic and mag card typewriters and standalone electronic cash registers; instrumentation; semiconductors; printed circuit boards; automatic test equipment; and dp supplies, with the exception of magnetic media for disk and tape drives. All peripherals that attach to a system are included. For computer-based manufacturing systems, such as computer-controlled machine tools, only the computer and hard-copy output devices are included and not the machine tool itself.

control put more pressure than expected during a recovery on the research and development budgets at many dp vendors. The biggest single project cutback was based on technological prudence, not bean counter insistence. IBM canceled its long-standing research into Josephson junctions. Wall Street analysts estimate that IBM spent up to \$150 million on this project, but since IBM is so huge, this expense didn't cause a blip on its profit and loss statement. That wasn't the case at DEC and StorageTek, where canceling projects also canceled some earnings. At Storage Tek, the cancellation of its CMOS mainframe cost the company about \$65 million, but the investors looking for a tax shelter ended up with a wipeout. This cancellation may eventually cost a lot more because the research partners have instituted a lawsuit against StorageTek.

One particularly thorny issue in their suit is the fact that StorageTek told them that all was well just a few short weeks before it canceled the project. Meanwhile, on the other coast, DEC caused a fury among its users by dropping its research on the Jupiter project to upgrade the DECsystem 10 and 20 mainframes. This change of mind cost DEC an estimated \$50 million.

The future looks ominous to many hardware vendors, in part because of high interest rates, but mostly because of the entry of American Telephone and Telegraph into the marketplace with competitive minicomputers and a strong software head start with its Unix operating system. Confusion over whether Unix will become a de facto standard in multi-user environments, and IBM's reaction to that possibility, led many dp managers to wonder about the future of their corporations' expenditures for MS-DOS-driven personal computers.

In last year's overview for the 1982 DATAMATION 100, we suggested that the data processing industry's challenge would be to react nimbly to quickly changing conditions. The industry did indeed face an enormous amount of turmoil, and seemed to heed our advice, as profitability improved greatly. In the coming year, the most successful companies should be those that meet the burgeoning demand for enduser computing and resolve the standards dilemmas. *

Reprints of the DATAMATION 100 survey, including individual company profiles, are available in quantities of 100 or more. Details may be obtained by telephoning Mary Ann Hariton, (212) 605-9729 or by writing to DATAMATION, 875 Third Ave., New York, NY 10022.



"This is your place, Jenkins. It will be your job to spot trends."

THE DATAMATION 100

THE LEADING U.S. DP COMPANIES

1983 RANK	1982 RANK	COMPANY	1983 TOTAL REVENUE	1983 DP REVENUE	1982 DP REVENUE	DP REV % GROWTH	DP REV AS % OF TOTAL
1	1	International Business Machines	\$40,180.0	\$35,603.0	\$29,265.0*	21.6%	88.6%
2	2	Digital Equipment Corp.	4,826.9	4,826.9	4,018.8	20.1	100.0
3	3	Burroughs Corp.	4,389.7	4,000.0	3,848.0	3.9	91.1
4	4	Control Data Corp.	4,580.0	3,500.0	3,301.0	6.0	76.4
5	5	NCR Corp.	3,731.0	3,333.2	3,149.1*	5.8	89.3
6	6	Sperry Corp.	4,745.3	2,799.6	2,802.9*	-0.1	58.9
7	7	Hewlett-Packard Co.	4,858.0	2,496.0	2,218.0*	12.5	51.3
8	8	Wang Laboratories Inc.	1,792.9	1,792.9	1,321.5	35.6	100.0
9	9	Honeywell Inc.	5,753.1	1,666.1	1,684.7	-1.1	28.9
10	10	Xerox Corp.	8,463.5	1,200.0	1,000.0*	20.0	14.1
11	19	Apple Computer Inc.	1,084.7	1,084.7	664.0	63.3	100.0
12	14	TRW Inc.	5,493.0	1,015.0	825.0	23.0	18.4
13	16	Tandy Corp.	2,703.8	945.0	725.0	30.3	34.9
14	29	Commodore International Ltd.	1,042.3	926.7	367.8	151.9	88.9
15	11	Storage Technology Corp.	886.6	886.6	1,079.2	-17.8	100.0
16	15	Data General Corp.	867.1	867.1	803.8	7.8	100.0
17	12	Texas Instruments Inc.	4,580.0	850.0	900.0*	-5.5	18.5
18	13	General Electric Co.	26,797.0	820.0	862.0	-4.8	3.0
19	17	Automatic Data Processing Inc.	816.5	816.5	704.0	15.9	100.0
20		American Telephone & Telegraph	69,403.2	807.1	802.2	0.6	1.1
21	53	Northern Telecom Inc.	2,610.2	807.0	754.8*	6.9	42.4
22	26	Amdahl Corp.	777.7	777.7	462.2	68.2	100.0
23	18	Computer Sciences Corp.	718.9	718.9	683.4	5.1	100.0
24	21	Electronic Data Systems	718.8	718.8	555.6	29.3	100.0
25	20	ITT Corp.	20,200.0	600.0	525.0*	14.2	2.9
26	34	Harris Corp.	1,642.2	580.0	332.5*	74.4	35.3
27	27	Rolm Corp.	549.3	549.3	447.7	22.6	100.0
28	22	Datapoint Corp.	547.8	547.8	512.9*	6.8	100.0
29	24	McDonnell Douglas Corp.	8,000.1	542.5	476.4	13.8	6.7
30	25	Comdisco Inc.	538.0	538.0	491.4*	9.4	100.0
31	28	Prime Computer Inc.	516.5	516.5	435.8*	18.5	100.0
32	23	Motorola Inc.	4,328.0	514.0	484.9	6.0	11.8
33	33	Tandem Computers Inc.	450.5	450.5	335.3*	34.3	100.0
34	30	National Semiconductor	1,385.0	425.5	365.0	16.5	30.7
35	35	Computervision Corp.	400.4	400.4	325.2	23.1	100.0
36	31	Management Assistance Inc.	388.2	388.2	354.2	9.5	100.0
37	37	Racal Data Communications Inc.	387.0	387.0	300.0	29.0	100.0
38	32	Mohawk Data Sciences Corp.	400.0	382.0	349.0*	9.4	95.5
39	41	C. Itoh Electronics Inc.	440.3	360.3	290.6	23.9	81.8
40	54	Tandon Corp.	343.9	343.9	177.1	94.1	100.0
41	39	Dataproducts Corp.	343.5	343.5	311.4*	10.3	100.0
42	36	Gould Inc.	1,324.8	334.0	325.0	2.7	25.2
43	37	Tektronix Inc.	1,208.8	300.0	300.0	NM	24.8
44	40	Tymshare Inc.	288.6	288.6	271.6*	6.2	100.0
45	42	Raytheon Corp.	5,937.3	285.0	283.0	0.7	5.0
46	44	3M	7,039.0	260.0	225.0	15.5	3.6
47	63	Intergraph Corp.	252.0	252.0	155.6	61.9	100.0
48	55	Boeing Co.	11,129.0	250.0	171.0	46.1	2.2
49		Mitel Corp.	241.0	241.0	181.7	32.6	100.0
50	61	NEC Information Systems Inc.	230.0	230.0	160.0	43.7	100.0

Ranking is by dp revenue in millions of dollars.

*Restated figure

NA: not available

NM: not meaningful

1983 EMPL	1982 EMPL	DP REV PER EMP (DOLLARS)	R & D 1983 (\$ MILLIONS)	% OF TOT REV	NET INCOME	RETURN ON ASSETS	% DP REV FROM FOREIGN SOURCES	FISCAL YEAR END
369,545	364,796	96.3	3,582	8.9	5,485.0	14.7	38.0	Dec.
78,500	68,000	61.4	544	11.2	262.1	5.7	36.0	June
64,000	62,000	62.5	248	5.6	196.9	4.7	NA	Dec.
55,858	56,000	62.6	270	5.9	161.7	1.8	33.0	Dec.
62,000	63,000	53.7	257	6.9	267.7	8.5	46.0	Dec.
43,738	42,356	64.0	296	6.2	176.7	3.3	33.0	March
72,000	68,538	34.6	494	10.1	432.0	10.3	41.3	Oct.
NA	19,700	NA	117	6.5	179.0	10.6	33.0	June
94,062	93,514	17.7	428	7.4	231.2	4.9	26.0	Dec.
107,100	109,940	11.2	555	6.5	466.4	5.0	NA	Dec.
4,582	3,400	236.7	71	6.5	59.0	10.6	25.0	June
88,374	85,099	11.4	133	2.4	205.2	6.1	24.0	Dec.
32,000	31,000	29.5	NA	NA	278.5	10.5	17.0	June
NA	4,100	NA	37	3.5	65.8	NA	35.0	June
NA	NA	NA	NA	NA	-40.9	-31.5	20.0	Dec.
15,400	14,765	56.3	84	9.7	29.0	3.4	34.0	Sept.
80,696	80,007	10.5	301	6.5	145.4	5.3	NA	Dec.
340,000	367,000	2.4	NA	NA	1,817.0	7.8	NA	Dec.
15,500	15,000	52.6	29	3.6	68.7	9.7	NA	June
NA	NA	NA	NA	NA	-4,874.7	NA	NA	Dec.
39,318	34,449	10.0	256.6	10.0	212.0	10.7	NM	Dec.
6,600	6,000	117.8	101	13.0	46.5	8.2	NA	Dec.
13,200	13,700	54.4	NM	NA	15.9	4.4	NA	April
13,500	13,148	53.2	NM	NA	67.4	16.6	2.0	June
278,000	283,000	2.1	1,024	5.0	674.5	4.9	NA	Dec.
22,000	26,000	26.3	90	5.5	63.7	4.6	30.0	June
7,604	6,020	72.2	41	7.5	34.1	4.2	NA	July
8,914	8,822	61.4	47	8.6	13.0	2.2	NA	July
7,177	7,500	75.5	NM	NA	274.9	5.7	14.2	Dec.
450	350	1,195.5	NM	NA	49.0	5.0	NA	Sept.
6,000	6,000	86.0	51	9.8	32.5	8.6	NA	Dec.
38,800	78,800	5.7	336	7.7	244.0	7.5	NA	Dec.
NA	3,600	NA	39	8.7	33.7	13.9	NA	Sept.
40,000	38,267	10.6	114	8.2	24.2	2.8	NA	May
5,000	4,130	80.0	43	10.9	35.3	10.1	NA	Dec.
6,049	5,800	64.1	18	4.6	1.0	0.4	44.2	Sept.
4,900	4,800	78.9	NA	NA	NA	NA	26.0	March
5,500	5,400	69.4	23	5.7	9.6	2.6	35.0	April
1,140	800	316.0	NA	NA	NA	NA	45.0	Dec.
1,700	2,500	202.2	16	4.7	27.2	8.7	7.0	Sept.
5,500	4,300	62.4	NA	NA	19.1	7.6	NA	March
20,651	19,976*	16.1	111	8.4	79.2	4.9	13.0	Dec.
20,605	22,924	14.5	131	10.8	48.3	4.4	36.9	May
3,302	3,600	87.4	NA	NA	-1.6	-6.1	NA	Dec.
76,100	72,000	3.7	NA	NA	300.1	8.0	NA	Dec.
85,847	87,388	3.0	384	5.4	667.0	11.5	NA	Dec.
2,500	1,800	100.8	28	11.1	29.3	NA	29.0	Dec.
84,600	95,700	2.9	NA	NA	355.0	4.7	71.0	Dec.
NA	NA	NA	28	11.8	NA	NA	NA	March
650	400	353.8	NA	NA	NA	NA	NA	March

THE DATAMATION 100

THE LEADING U.S. DP COMPANIES

1983 RANK	1982 RANK	COMPANY	1983 TOTAL REVENUE	1983 DP REVENUE	1982 DP REVENUE	DP REV % GROWTH	DP REV AS % OF TOTAL
51	45	Perkin-Elmer Corp.	1,066.6	225.0	205.2*	9.6	21.0
52	95	SCI Systems Inc.	300.1	225.0	80.0	181.2	74.9
53	51	Telex Corp.	306.6	221.7	194.7	13.8	72.3
54		Seagate Technology	221.0	221.0	57.0	287.7	100.0
55	57	Shared Medical Systems Corp.	210.8	210.8	165.7	27.2	100.0
56	60	General Instrument Corp.	891.7	210.0	163.0	28.8	23.5
57	48	Paradyne Corp.	209.0	209.0	207.3	0.8	100.0
58	58	Exxon Corp.	94,591.0	200.0	165.0	21.2	0.2
59	50	M/A-Com	654.4	200.0	200.0	NM	30.5
60	49	Philips Information Systems	200.0	200.0	203.0	-1.4	100.0
61	46	Sanders Associates	646.5	200.0	175.0*	14.2	30.9
62	56	Informatics General Corp.	197.9	197.9	170.2*	16.2	100.0
63	62	CPT Corp.	192.1	192.1	158.5	21.1	100.0
64	75	Dun & Bradstreet Corp.	1,616.9	185.0	132.4	39.7	11.4
65	68	Dysan Corp.	180.0	180.0	142.8	26.0	100.0
66		Intel Corp.	1,121.9	175.0	140.0	25.0	15.5
67	72	Continental Telecom Inc.	2,101.3	174.8	139.3	25.4	8.3
68	69	Cray Research Inc.	169.7	169.7	141.1	20.2	100.0
69	88	Televideo Systems Inc.	168.7	168.7	98.5	71.2	100.0
70	65	BASF Systems Corp.	165.0	165.0	150.0	10.0	100.0
71	73	Centronics Data Computer Corp.	164.1	164.1	138.4	18.5	100.0
72	89	Convergent Technologies Inc.	163.5	163.5	96.5	69.4	100.0
73	65	Diebold Inc.	445.9	160.0	150.0	6.6	35.8
74	59	Signal Cos.	6,151.0	160.0	177.3*	-9.7	2.6
75	84	Gerber Scientific Inc.	159.1	159.1	114.7*	38.7	100.0
76	77	Martin Marietta Corp.	3,899.3	154.0	125.0*	23.2	3.9
77	78	Quotron Systems Inc.	153.8	153.8	120.9	27.2	100.0
78	70	Wyly Corp.	153.0	153.0	140.5	8.8	100.0
79	67	Allied Corp.	10,022.0	152.2	147.1	3.4	1.5
80	87	Verbatim Corp.	147.0	147.0	98.6	49.0	100.0
81	86	Management Science America Inc.	145.2	145.2	101.2	43.4	100.0
82	79	Reynolds & Reynolds	263.9	145.0	120.0*	20.8	54.9
83	71	Nixdorf Computer Corp.	141.1	141.1	140.0	0.7	100.0
84	81	NBI Inc.	140.8	140.8	119.5*	17.8	100.0
85	73	Planning Research Corp.	318.0	135.6	138.4	-2.0	42.6
86	76	Lear Siegler Inc.	1,527.4	130.0	128.0*	1.5	8.5
87	82	Bradford National Corp.	144.4	127.4	115.4*	10.3	88.2
88	80	National Data Corp.	127.0	127.0	120.3	5.5	100.0
89	83	Recognition Equipment	117.0	117.0	112.4*	4.0	100.0
90	97	Micom Systems Inc.	113.7	113.7	78.0	45.7	100.0
91		Compaq Computer Corp.	111.2	111.2	NA	NM	100.0
92		Canada Systems Group	109.5	109.5	99.8	9.7	100.0
93	85	Commerce Clearing House Inc.	378.8	109.2	104.5	4.4	28.8
94		Cullinet Software	108.0	108.0	63.6	69.8	100.0
95	99	Schlumberger Ltd.	5,797.5	108.0	76.2	41.7	1.8
96		Docutel/Olivetti Corp.	215.0	105.0	90.0	16.6	48.8
97	100	Decision Data Computer Corp.	103.8	103.8	74.3	39.7	100.0
98	98	Printronic Inc.	101.3	101.3	77.4	30.8	100.0
99	91	Floating Point Systems	100.2	100.2	89.0	12.5	100.0
100		Mead Corp.	2,366.6	94.5	66.2	42.7	4.0

Ranking is by dp revenue in millions of dollars.

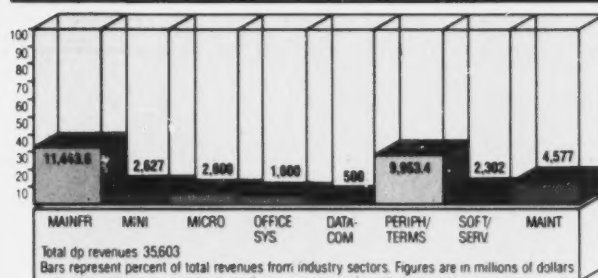
*Restated figure

NA: not available

NM: not meaningful

1983 EMPL	1982 EMPL	DP REV PER EMP (DOLLARS)	R & D 1983 (\$ MILLIONS)	% OF TOT REV	NET INCOME	RETURN ON ASSETS	% DP REV FROM FISCAL FOREIGN SOURCES	YEAR END
14,372	14,100	15.6	80	7.5	51.8	5.8	NA	Dec.
4,006	2,920	56.1	NA	NA	8.4	6.8	NA	June
3,923	3,933	56.5	14	4.6	33.8	NA	13.0	March
2,100	339*	105.2	5	2.5	29.6	15.8	NA	Dec.
2,400	1,825	87.8	17	8.3	27.3	NA	NA	Dec.
NA	22,000	NA	38	4.3	52.0	6.4	NA	Feb.
3,500	3,072	59.7	19	9.3	3.7	1.4	NA	Dec.
3,000	3,000	66.6	NA	NA	4,186.0	6.6	NA	Dec.
9,508	8,739	21.0	26	4.0	NA	NA	NA	Dec.
NA	1,632	NA	NA	NA	NA	NA	NA	Dec.
9,394	7,859	21.2	24	3.8	42.6	9.1	NA	Dec.
2,822	2,600	70.1	7	3.7	8.5	5.9	9.5	Dec.
1,636	1,458	117.4	9	4.6	17.2	NA	NA	June
26,361	25,681	7.0	84	5.1	167.4	14.1	10.0	Dec.
NA	2,900	NA	35.0	19.0	48.9	20.0	NA	Oct.
NA	NA	NA	142	12.6	116.1	6.9	NA	Dec.
22,154	21,698	7.8	NA	NA	172.4	4.0	NA	Dec.
1,551	1,352	109.4	25	15.0	26.1	9.3	NA	Dec.
867	491	194.5	6	4.0	22.4	12.4	NA	Oct.
NA	1,200	NA	NA	NA	NA	NA	NA	Dec.
1,700	2,000	96.5	11.7	7.0	-7.7	NA	NA	Dec.
1,000	450	163.5	16.4	10.0	14.9	17.3	NA	Dec.
5,824	6,051	27.4	8	1.9	49.1	18.5	NA	Dec.
55,000	42,600	2.9	443	7.2	103.0	1.9	NA	Dec.
1,500	1,300	106.0	8	5.5	11.3	9.1	NA	April
42,000	40,900	3.6	95	2.4	141.3	4.9	40.0	Dec.
1,425	1,164	107.9	10	7.0	23.9	NA	NA	Dec.
1,875	1,850	81.6	9	6.4	0.2	NA	NA	Dec.
117,750	44,337	1.2	394	3.9	98.0	1.2	32.0	Dec.
2,840	1,790	51.7	11	7.8	15.0	13.2	15.0	July
1,866	1,348	77.8	28	19.9	10.8	6.7	21.0	Dec.
3,365	3,349	43.0	7	2.9	13.8	9.4	NA	Sept.
1,700	1,700	83.0	NA	NA	NA	NA	NA	Dec.
1,665	1,096	84.5	NA	NA	3.5	2.1	NA	June
5,600	6,200	24.2	NA	NA	11.3	7.1	NA	June
20,000	22,000	6.5	30	2.0	73.4	8.2	NA	June
NA	3,000	NA	NA	NA	0.4	NA	NA	Dec.
2,253	2,458	56.3	2	1.7	11.3	12.0	2.1	May
1,944	1,924	60.1	6	5.4	9.6	NA	NA	Oct.
1,559	915	72.9	10	9.0	18.3	26.1	23.2	March
614	96	181.1	NA	NA	4.7	NA	NA	Dec.
NA	NA	NA	NA	NA	0.8	NA	NA	Dec.
5,654	5,300	19.3	NA	NA	24.9	8.2	NA	Dec.
1,050	706	102.8	10	9.6	15.3	NA	NA	Dec.
NA	NA	NA	NA	NA	1,084.3	13.8	NA	Dec.
NA	NA	NA	6	2.7	-14.0	-58.3	NA	Dec.
1,160	1,100	89.4	5	4.9	5.4	NA	NA	Nov.
1,320	1,097	76.7	4	4.1	6.9	10.9	13.0	March
1,319	1,390	75.9	12	12.2	13.1	NA	NA	Oct.
1,040	700	90.8	NA	NA	30.0	5.5	NA	Dec.

1



INTERNATIONAL BUSINESS MACHINES

Old Orchard Road
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(914) 765-1900

IBM rode the recovery to yet another record year in 1983, this time with corporate revenues topping the \$40 billion mark. Once again Big Blue was the most profitable manufacturer in the country, with net earnings up 24% to \$5.5 billion. Because IBM does not report specific product revenues, the overall dp and product category revenues listed here represent DATAMATION estimates. In 1983, dp revenues rose 22%, to \$35.6 billion from \$29.3 billion, with most business segments performing well.

It was one of the most eventful years in IBM's history. In February, chief executive officer John Opel succeeded Frank Cary as chairman of the board, and his influence was immediately felt. IBM pursued new and existing markets with vigor, continued its push to become the preeminent low-cost producer, chased some competitors in court, and embarked on ventures it had never before tried.

The company introduced several new processors during the year, beginning with the long-awaited System/36 in May. That machine replaced the most widely installed computer in IBM's history (PCs excepted), the System/34. IBM also brought out two high-end models of the 4300 mainframe line and new models in the System/38 and Series/1 lines.

But the most attention was paid to a rash of new products introduced in the PC line, which in January consisted of only one model. First came the PC XT, which was announced in March. That was followed by products that allowed 3270 terminals to act as PCs and vice versa, and in October, by the 3270 PC and the PC XT/370. Finally, in November, IBM admitted to the worst-kept secret of the year, the PCjr.

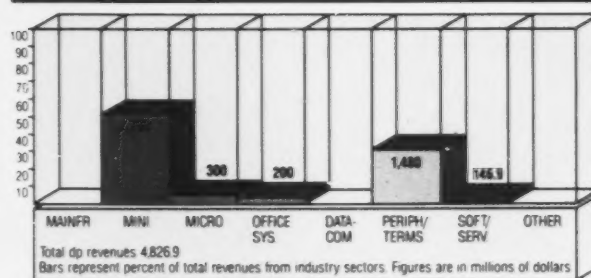
IBM also introduced the 5080 color graphics system, the Database 2 mainframe DBMS, several printers, the 4730 personal banking ATM, and the 7540 manufacturing system. The year also saw the first deliveries of two major IBM products, the 3084 top-end mainframe and the MVS/XA operating system.

IBM also came closer to its goal of being the industry's low-cost supplier. While revenues increased 17% and income 24%, the payroll grew only 1.4%, indicating IBM was able to earn significantly more money per employee than in the past.

When it wasn't premiering new products, IBM was suing competitors such as Hitachi and National Advanced Systems on a variety of trade secrecy charges. Both companies eventually relented under the pressure of IBM's lawyers.

IBM also got under the skins of Intel and Rolm, but in a more positive vein. The company acquired substantial chunks of both Silicon Valley firms, the first such investments in IBM's history. At year-end, IBM owned close to 20% of each firm.

2



DIGITAL EQUIPMENT CORP.

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Maynard, MA 01754
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Calendar 1983 was a bad year for DEC, even though revenues climbed a respectable 20% to \$4.8 billion. Earnings fell dramatically in the third quarter, dropping net income for the year 24.5% to \$262.1 million from \$347 million in 1982. DEC's management received low marks for its handling of the bad news; it had told security analysts in September to expect a strong quarter, only to report a few weeks later that the quarter's earnings were off 72%. "This doesn't speak well for their internal control system," Ulric Weil of Morgan Stanley commented at the time of the announcement.

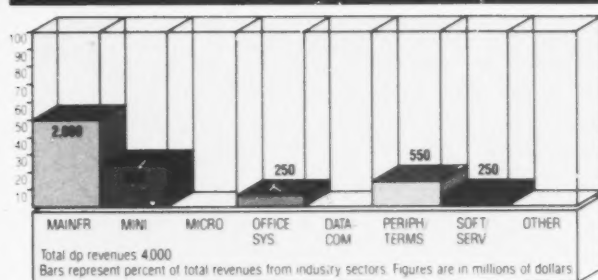
Two factors were primarily responsible for Digital's breakdown. First, the company decided in the spring to cancel the Jupiter upgrade to the DECsystem 10 and 20 mainframes. Jupiter, which would have used ECL circuitry to run at 2.5 to 3 MIPS, had cost some \$50 million at the time it was canceled. DEC set up a clearinghouse at the Marlboro, Mass., plant where the DECsystems were manufactured, so that users could help each other migrate to the VAX line of superminicomputers.

The VAX line, however, was the second major cause of DEC's earnings tumble. The high-end VAX-11/780 has been on the market for close to seven years, and products from IBM, Data General, and Prime have all eclipsed the 780 in processing power. DEC's upgrade, the 11/785, was finally announced this past April, three years late. Moreover, the Venus project, which will provide a processor to top off the VAX line later this year, was also delayed during 1983. Digital had its problems in the peripherals area too, because it encountered production difficulties related to its new disk drive.

In response, DEC moved forcefully on one front, changing its management style away from the separate product groups and into a more cohesive organization. Even as it was doing so, however, it was hemorrhaging vice presidents. By the end of the year, half a dozen senior executives had left DEC for other Massachusetts firms. Perhaps the loss that hurt the most was that of C. Gordon Bell, DEC's chief engineer and the architect of much of DEC's computer systems product lines.

Despite the problems, Digital had a few occasions to celebrate in 1983. It introduced two new machines for the low end of the VAX line, the 725 and the MicroVAX1—the first VAX on a chip. In addition, the company introduced the VAXclusters concept to enable users to form networks of closely connected VAX machines. DEC also announced that, after Venus debuts at the high end, a new low-end machine dubbed the MicroVAX2 would follow by year-end.

3



BURROUGHS CORP.

Burroughs Place
Detroit, MI 48232
(313) 972-7000

They're playing a new song in this part of the Motor City. Burroughs no longer wants to be known as a run-of-the-mill manufacturer of hardware and software. In 1983 the company announced its transformation to a total service organization that would be "second to none" in its commitment to service.

Burroughs may indeed have kept its word, although it finished second to a few in 1983. It was a slow first nine months, but fourth quarter orders 25% above those of 1982 changed the agony to ecstasy.

Overall revenue increased 5% to \$4.39 billion. Net income jumped 67% to \$196.9 million. The comparisons are skewed by a fiscal year change and significant write-offs at the end of the 1982 calendar, but they still tell a good story.

Possibly more important from the company's standpoint, Burroughs was very active in new products and developments. The company put its money where its mouth was by increasing its R&D budget a healthy 13%.

Foremost among the new products was the A9 series of mainframes. It comes in B, D, and F models, ranging from 1.2 to 2.5 MIPS. It's officially designed to replace the B6900 series and unofficially aimed at countering the new IBM 4361 and 4381 models introduced last fall. Delivery on the F model began in the second quarter; the other two will be available in the first quarter of 1985.

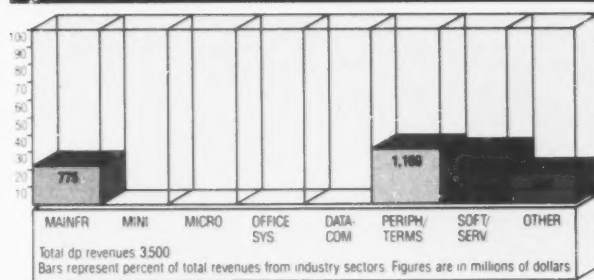
Other new products included the ET1100 and ET2000 electronic workstations, the B95 addition to the B90 family, the B1990 small system, and the B2925 midrange system.

These new offerings were nevertheless mere precursors to the expected introduction of the intelligent workstation, the B25, which one security analyst called "a critical ingredient in Burroughs' 1984 performance." Burroughs has big plans for this machine, the successor to the unspectacular B20 and also bought from Convergent Technologies. The company is bypassing direct distributors, preferring to go through independent dealers. To show it means business, Burroughs plans to increase that force from 200 to 700.

A joint venture was formed with Telex Computer to investigate gas plasma display technology. Graphics Technology Corporation (Graftek), a CAD/CAM manufacturer and distributor, was acquired in February. In addition, U.S. and international sales were brought together for the first time under Worldwide Marketing, an international advisory board.

Burroughs has undergone many such transformations in the last three years, causing much management turmoil. The year 1984 should determine whether the latest will be the last.

4



CONTROL DATA CORP.

8100 34th Ave. S.
Minneapolis, MN 55420
(612) 853-8100

Control Data continues to set itself off from the rest of the BUNCH by concentrating on supercomputers, peripherals, and services. Indeed, less than 20% of its business currently competes directly with IBM, and that has enabled the company to withstand both the recession and IBM's more competitive posture. As a result, corporate revenues continued their climb, growing 5.5% to \$4.58 billion in 1983, while net income increased 4% to \$161.7 million. Dp revenue increased 6% to \$3.5 billion.

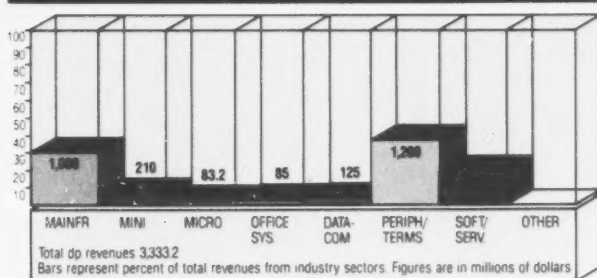
Although CDC is often considered a mainframer, its largest businesses are peripherals and services. The peripherals segment, which sells a wide range of disk and tape drives that are compatible to IBM equipment, remained flat at \$1.1 billion in 1983, but it introduced several products at the low end that are expected to have an impact in 1984 and beyond. Control Data is so far the only major supplier with a foot in the sub-5¼-inch disk drive market, which it entered in May 1983 with the Cricket series of 3½-inch floppy disk drives. And while the high-end 33800 IBM-compatible thin film disk drive did not contribute to revenues in 1983, it should reach volume production this year. Even though IBM has had a year-long jump on the 33800-compatible market, analysts expect that Control Data should be able to ship 800 to 1,000 of the 33800s in 1984.

Control Data is also the largest remote computing services company in the world, chalking up a solid 11% gain in revenue, to \$1 billion in 1983. The processing services revenues are divided among the Business Information Services division, the Cybernet scientific and engineering services offerings, and the PLATO educational service. In the fourth quarter of 1983, PLATO finally achieved profitability, and the company expects that it will become a major contributor to the company's earnings in the future. More than 12,000 hours of courseware are available.

Control Data's CYBER series of supercomputers continues to battle crosstown-rival Cray Research in the upper echelons of MIPSdom. The CYBER 205 and 170 lines grew at a 10% clip in 1983, reaching \$775 million in revenues.

The company cut back its R&D expenses severely in 1983, a 17% drop to \$270.7 million, but it increased its stake in two cooperative ventures. The Microelectronics and Computer Technology consortium—which William C. Norris, Control Data's chief executive, founded in late 1982—established a permanent headquarters and staffed seven major research projects during 1983. The Semiconductor Research Corp. funded 47 grants to 32 universities covering basic technology fields in 1983.

5



NCR CORP.

1700 South Patterson Blvd.
Dayton, OH 45479
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NCR celebrates its 100th anniversary this year. It should be one hell of a party.

The company finished its 99th year by setting records in revenue and net income: revenue increased 6% to \$3.73 billion; net income rose an impressive 23% to \$287.6 million.

So while many of its competitors struggled through 1983, NCR reaped the benefits of an expanded product line and strong order gains, particularly in the retail sector. This reflected the favorable reception given to NCR's new products, ranging all the way from micros to the initial models on its new 9300 mainframe line. Stringent cost controls, imposed early in 1980, also were a significant factor in contributing to what one Wall Street analyst called "an eminently successful year."

Things could get even better in 1984. NCR plans to further enhance its product line, which increased significantly in 1983. Several peripherals, productivity tools, and utilities transformed the Tower 1632 dp unit, released in late 1982 to oem markets, into a fully featured end-user system. NCR and Intel announced a new midrange, local area network called Mirlan. That was followed by the addition of seven new models to NCR's V-8600 family of large-scale computers. The company also entered the burgeoning telecommunications market by forming NCR Telecommunications Services Inc.

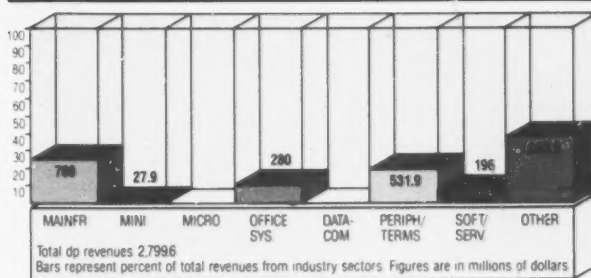
The company picked up in 1984 where it left off in 1983. A flurry of new products was highlighted by the NCR 7950, a general purpose clustered terminal system designed to be plug-compatible with the IBM 3270 operating in a communications intensive SNA/SDLC environment, and the NCR 5310 and 5320, a computer output microfilm system controlled by a personal computer.

NCR and Honeywell agreed that Honeywell will use NCR's 32-bit VLSI processor chip in the development of a future small- to medium-scale computer system. The companies will also jointly develop a custom chip.

"NCR begins 1984 in the strongest financial position in recent company history," declares president and ceo Charles Exley, who assumed those offices in April 1983 upon William Anderson's retirement. "We are very optimistic about our future prospects."

They have every reason to be.

6



SPERRY CORP.

1290 Avenue of the Americas
New York, NY 10104
(212) 484-4444

Sperry came close to reversing its long slide during 1983, recording a slight drop in most areas but a hefty 29% jump in net income, to \$176.7 million from \$137.2 million. Corporate revenues declined just over 1%, to \$4.75 billion from \$4.8 billion. Dp revenue, which represents slightly less than 60% of the company's business, also dropped 1%, to \$2.79 billion from \$2.80 billion. On the expense side, R&D funding increased 1% to \$296.4 million from \$293.5 million—about 10.5% of dp revenues in both years. Sperry also paid off a large chunk of its corporate debt, which improved its financial picture (1982 revenues have been restated in light of an accounting change made last year).

Sperry's performance was bolstered by two major government contracts. On Jan. 27, it bested Burroughs to snag a \$476 million, eight-year contract with the U.S. Air Force. The contract—the largest dp contract in history—calls for Sperry to install 153 of its midline 1100/60 mainframes and more than 20,000 terminals at all major Air Force bases around the world. Then, on May 30, Sperry beat IBM for the right to supply the Navy with a new generation of shipboard combat computers. That deal, which calls for 770 ANUYK-43 computers and 300 spares, is worth \$433.2 million to Sperry over five years.

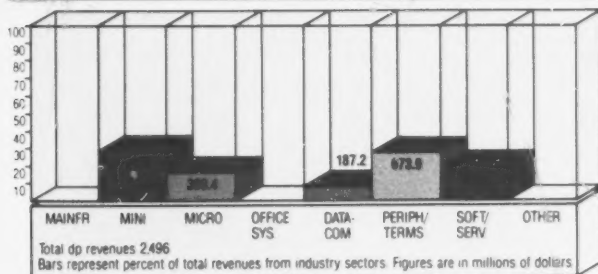
Despite those two contracts, Sperry's mainframe revenues continued to decline during 1983, slumping 4% to \$700 million from \$728 million, as the company's user base continued to erode. Revenues from minicomputers and peripherals were flat over the year, and software revenues dropped 22% to \$196 million. Nonetheless, the Mapper application development software prospered, surprising Sperry executives who did not want to sell it.

On the positive side, maintenance and repair revenues were up slightly over 1982, and office systems revenues grew a healthy 11%, largely because of the early success of the Sperrylink office automation system introduced late in 1982. Other dp product revenues, mainly defense related, improved 6% to \$475.9 million.

While the Sperrylink, Mapper, and 1100/90 products began making their ways into user installations, Sperry continued to introduce new products. Substantially behind all of its major competitors, Sperry introduced its first personal computer in November, a modification of a Mitsubishi pc that is also being marketed by Leading Edge. Sperry said that the pc is being sold primarily to its mainframe user base.

Sperry's dp operations were renamed the Computer Systems Division in the spring, dropping the venerable Univac name.

7



HEWLETT-PACKARD

3000 Hanover St.
Palo Alto, CA 94304
(415) 857-1501

If its competitors had this kind of a year, they'd be dancing in the streets. At Hewlett-Packard, they just go about their business.

The world's second largest minicomputer maker went about it pretty well, thanks. Corporate revenues increased 12% to \$4.86 billion. Dp revenues did slightly better, jumping 12.5%. So did all the components, led by micro sales, which leaped 54.8%. Net earnings were ahead 13%, to \$432 million.

Orders were up 18%, resulting in a \$1.01 billion backlog at the end of 1983, compared to \$768 million in 1982; third and fourth quarter orders showed the best year-to-year gains since 1980. All four of the company's business segments reported increased business. Total employment rose by about 4,000. And research and development increased 14.4% to \$494.5 million, matching HP's goal of 10% of sales.

So what's so bad about feeling good? Well, '83 didn't quite match '82, when HP's revenue swelled 17.3% and earnings soared 25%. The company also continued to have troubles overseas, where a strong dollar led to HP's U.S.-manufactured products being less competitive in non-U.S. markets.

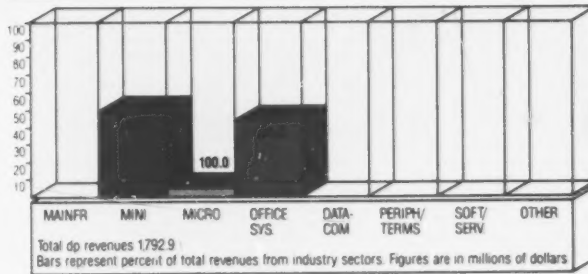
Speaking of U.S.-manufactured products, HP stepped full force into the volatile personal computer market with the HP 150. All users have to do is touch the screen, and their wish is the 150's command. To support this market entry, the company plans to triple its 450 retail outlets and has launched a \$10 million television advertising campaign.

In another significant move, HP and AT&T Information Systems (ATTIS) completed joint certification testing of the HP 3000 business computer, the HP 150, and HP data workstations to use with ATTIS' Dimension System 85. This represented part of HP's effort to offer the industry's most comprehensive interconnect services.

HP was equally active with overseas firms, forming what president John Young termed a "very significant" joint venture with Samsung Electronics Company of Korea to manufacture computer products and sell and support HP products in Korea. HP also increased its stake in a Japanese joint venture to 75% from 49% by buying more than \$35 million of new stock in the company, Yokogawa-Hewlett-Packard Ltd. of Tokyo. Trying to prove good things come in threes, HP entered into a joint venture with Genetech Inc. to develop instruments and systems for use by biotechnology industries.

Management indicated it was approaching the first half of 1984 "with caution," but was "optimistic" about prospects for the year. Odds are it's understating the case.

8



WANG LABORATORIES, INC.

1 Industrial Avenue
Lowell, MA 01851
(617) 459-5000

Dr. An Wang's prescription for success continued to pay off in 1983. The company's vital signs are good, but not great. Total corporate revenues, which leapt by 31% in 1982 and 48% the year before, grew by 26% in 1983 to almost \$1.8 billion.

One Wall Street firm, recommending Wang as a company that "will move well ahead of the overall market," predicts the company will post annual earnings increases of about 30% through the rest of the middecade. Wang has set \$5 billion as its target for 1990 revenues, and analysts seem to think a bull's-eye quite probable.

But year-end reports showed that while revenues were up, the strength of the dollar and competitive pricing had hurt the level of Wang's profits. For example, pretax profits for the fourth quarter of '83 (12.1%) were off slightly from fourth quarter '82 (12.6%). Still, these figures are higher than those for the rest of the minicomputer/office automation vendors—operating margins for the industry averaged 10.1% for the year.

In October, Wang held a press conference to announce what one observer called "everything but the kitchen sink. And if you could attach a kitchen sink to a personal computer, they would have announced that too." Some of the announcements revealed that a strategic shift had taken place at Wang.

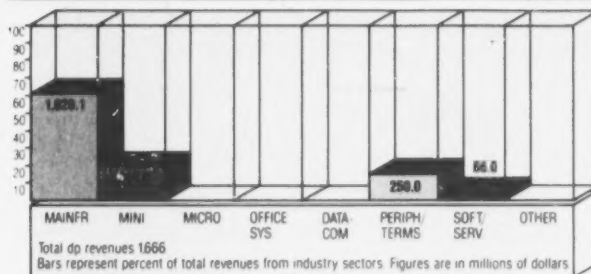
Wang's Information Distribution System is a family of software products that provide a pathway to support services and applications between Wang VS systems and IBM or IBM plug-compatible hosts over an IBM 3270/SNA or BSC network. Wang admitted the announcement was equal to a de facto surrender to IBM standards. IDS is a first step toward an open architecture, says John F. Cunningham, Wang's chief operating officer. The significance of IDS "lies in the fact that most large companies have equipment from a number of vendors." So IDS will support IBM, UNIX, DEC, and X.25 protocols.

IDS did not mark a complete surrender, however; proud of its eminence in word processing, the text and document standards under the IDS umbrella are Wang's own.

Announced at the same time was Wang Office, a set of mail, directory, time management, and file management services; PACE, a fourth generation database management system; WP Plus, an enhanced word processing system; a clustered personal computer network; and PIC.

PIC, the Professional Image Computer, is based on Wang's Professional Computer. The desktop-sized PIC will scan images and digitize them for manipulation by the user.

Wang's pc continued to poke along, having sold only about 75,000 units since it was introduced. And one observer notes that what sales were made came at the expense of Wang's own word processing and minicomputer systems.



HONEYWELL INC.

Honeywell Plaza
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Honeywell started 1983 as if it were still hung over from 1982, which was not a very good year.

Overall revenue was up 4.8% to \$5.8 billion from \$5.5 billion. Ordinarily that means a good year, but not for Honey; well this time. Net income, the only number that matters, dropped 15.3% to \$231.2 million from \$272.9 million.

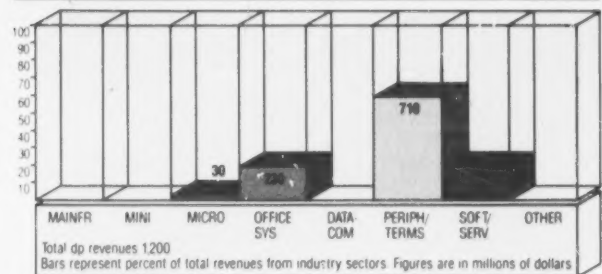
Most of that decline occurred in Synertek, the company's semiconductor operation. Synertek's orders improved significantly in the fourth quarter, but its dependence on the electronic games business, particularly Atari, kept it in the red.

The good news was that Honeywell Information Systems (HIS), which accounts for more than 30% of Honeywell's revenues, showed its strongest signs of life since 1980. In 1981-82, more than 2,500 employees were released by HIS. That cost-cutting measure and a sharp increase in orders in the second half of 1983 yielded a hefty 63.7% increase in profits, to \$131 million from \$80 million, even though revenue decreased to \$1.67 billion from \$1.69 billion. The performance was an impressive comeback from 1982, when HIS revenues fell 50%. The situation is expected to further improve this year, as HIS struggles happily with a large order backlog. Volume shipments of DPS 88 systems should also contribute to revenue growth.

Honeywell was active on the products front, adding several new items to the low end of the line. The microSystem 6/10 is designed to be an end point in a larger network. The microSystem 6/20 provides for a cluster of up to four stations. The DPS 6/40 can handle as many as 28 stations.

The most significant new product comes not from Minneapolis but Japan. Like most of the BUNCH, Honeywell is having a rough time in the mainframe seas. It abandoned at least part of the ship by announcing it will buy some of its mainframes from NEC of Japan, marketed under the Honeywell label. If all goes well, Honeywell may produce the machines itself. The two companies will also jointly develop future large-scale products.

Ironically, NEC was an original licensee of Honeywell's technology, using that license to enter the computer market. Now it's helping its benefactor. Honeywell also teamed up with NCR to develop a custom integrated circuit chip for small- to medium-scale systems. All parties involved are hopeful these ventures will be mutually beneficial.



XEROX CORP.

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Stamford, CT 06904
(203) 329-8700

Xerox has yet to duplicate its original success in the copier business. When the copier king lost the crown and, alas, some revenue it began to search around for new realms of opportunity. The office automation kingdom was a natural choice—but so far, not a profitable one.

Xerox's OA and copier operations have indeed become a drain on the company's resources, but those resources are still quite considerable. Xerox reports its dp revenue in 1983 nudged up slightly to \$1.2 billion; corporate revenues were flat, at \$8.5 billion. Corporate net income increased 27% to \$466 million, but the company's profit margin of 5.5% lagged past performance and industry averages.

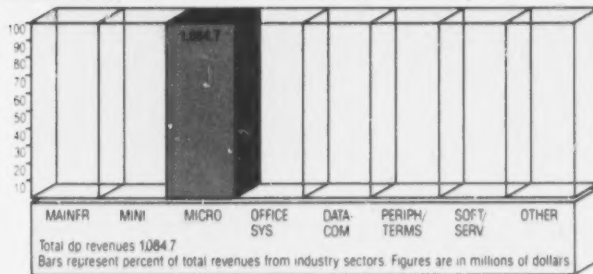
There were no spectacular increases on the data processing front either. DATAMATION estimates the biggest gains were scored in the office systems category, where revenues reached \$230 million, up 15% from the year before. At the opposite extreme were terminals and peripherals, which fell off 6% to \$780 million. Micros also remained static at \$30 million and software and services inched up only 1% to \$260 million.

Xerox had a relatively poor showing in the peripherals arena. It still hasn't managed to get the most out of such peripherals subsidiaries as Shugart Associates, Versatec, Century Data Systems, and Diablo. Indeed, the sale of printer products was way down last year, say industry insiders. One estimate is a \$50 million pretax loss in the disk drive business. One bright note was the 200 series printer, which is doing very well.

Xerox must find customers for its office automation wares. Strong on the technology side, the company can't seem to translate that strength into earnings. Early this year it came out with two new 8010 Star workstations designed to broaden its customer appeal in the fiercely competitive OA market. One is a standalone system priced at \$9,995 and the other is a remote workstation selling for \$8,995. Xerox also slashed the price of the 8010 Star Ethernet workstation by 34% to \$15,055. The company hopes the price cut will help pick up sagging sales.

Last June, Xerox formed a "corporate office" that includes three of its top executives. The triumvirate consists of president and ceo David Kearns, chairman C. Peter McCollough, and William Glavin, president of Xerox's business equipment groups. Glavin's elevation to this elite corporate circle indicates that Xerox is serious about its office efforts, but it doesn't look as if the turnaround, expected for the last few years, is in the cards in 1984 either.

11



APPLE COMPUTER INC.

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Cupertino, CA 95014
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Growing up is hard to do, and 1983 was a very difficult year for Apple. The goal for 1983 was to crack the IBM-dominated office market in a big way with Lisa, its \$10,000 pc. The results are in, and Apple failed. In the process it lost its dominance of the pc market and posted a 17% decline in earnings. On the brighter side, Apple's Macintosh was introduced to mostly raves and may reverse a depressing 1983.

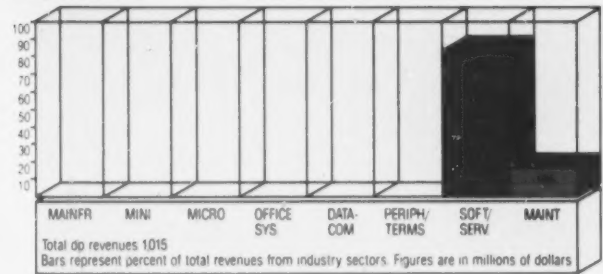
While 1983 revenues were impressive—a 63% increase to \$1.08 billion—earnings began falling in the September quarter and fell even faster by December. For the calendar year, earnings were \$59 million, down 17% from 1982.

The strategy for Lisa was simple, sell to the Fortune 1,000 companies. These customers were less than enchanted with Lisa's price/performance, however, as well as with Lisa's inability to connect with their dp departments. By September, Apple revised its plans, and started pushing Lisa without its software and at a substantially reduced price. The strategy, effected by Apple's new national sales force, not only failed to stimulate business, but upset the company's independent dealers. While Apple was struggling with its ill-suited product and poor marketing plan, IBM took over the market.

By November, newly appointed president John Sculley from PepsiCo could see red ink. Reacting quickly, he developed, then announced, a long-term strategy. The main theme was a family of 32-bit micros marketed to smaller companies through the independent dealers. The next phase was to be a new 32-bit micro, which turned out to be Macintosh. Sculley stressed the importance of building communication bridges for its computers to the IBM mainframe environment. In addition, he announced plans to introduce new products for the Apple IIe to take advantage of the installed base.

These plans seem more realistic than that of tackling the Fortune 1,000 with the untested Lisa. Early indications are that Macintosh is now the number one pc, thanks to Sculley's carefully laid out marketing plan, which featured an intimidating tv commercial that prompted an enormous number of sales on the day Macintosh was released. To really do justice to many of the advanced third-party programs being written, larger memory and storage capacities are required. (In its first configuration, the Mac comes with only 128K memory and no hard disk storage.) Apparently, though, Apple is learning that the best route to profits is through keeping the customers happy, and that's what Mac seems to be doing.

12



TRW INC.

23555 Euclid Ave.
Cleveland, OH 44117
(216) 383-2121

A company called TRW makes a lot of money—\$5.49 billion in 1983—making a lot of things, and some of that money is made in dp. Last year, TRW's dp ventures produced revenues of \$1.015 billion, most of it from services and software—\$850 million—and the rest from third-party maintenance and repair—\$165 million. These dp revenues were about 23% higher than those for 1982. Since TRW's overall revenues only improved by about 7% over the year before, dp was obviously one of the bright spots in this veteran conglomerate's portfolio of businesses.

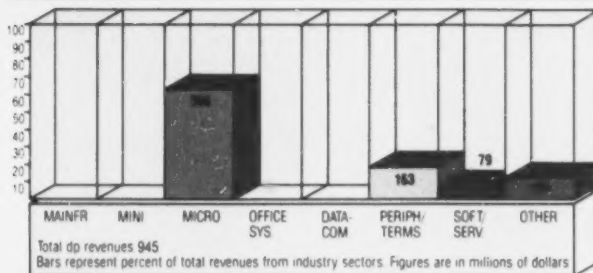
People who imagine conglomerates to be recent phenomena should note that TRW began life in 1901 in Ohio as the Cleveland Cap Screw Company. And while TRW, like most conglomerates, is better known for acquiring companies, it is sometimes forced to shed them: last year TRW dropped out of the TRW-Fujitsu Co. (TFC), ceding most of this point-of-sale, bubble-memory-equipped terminal business to its partner in the onetime joint venture.

The company's biggest dp money-maker was its credit analysis operation. Running on IBM equipment, TRW maintains trade payment data that demonstrate the payment habits of nearly 8 million business locations from all industries. About 7,000 companies contribute automated and manual accounts receivable information to the database every 90 days. Last year, TRW boasted that its files contained "over 20 million lines of payment experiences."

The consumer credit part of the business maintains credit information on more than 90 million consumers, and supplies credit reports to 24,000 customers doing business at 35,000 sites. TRW says it can generate as many as 250,000 credit reports a day. (Management is said to view this U.S.-centered business's 12 inoperative hours a day as wasted profits, prime time for new business. There is talk that expansion of the service to customers in Europe and the Far East could mean a round-the-clock production cycle and round-the-clock profits. In 1983, 24% of the company's dp revenues came from abroad, down from the 28% that was posted in 1982.)

Last year was the middle year in TRW's five-year plan aimed at increasing software productivity. The company says the results have been promising: it claims that doubling productivity by 1985 and quadrupling it by 1990 are realistic aims.

13



TANDY CORP.

1800 One Tandy Center
Fort Worth, TX 76102
(817) 390-3700

In the rough and tumble world of personal computers, Tandy was one company that did not gain ground during 1983. Its sales were up, but not as much as Commodore's, Apple's, or IBM's. Yet considering that Texas Instruments was falling by the wayside, Tandy's performance has to be considered good. Dp revenues were up 30% to \$945 million from the \$725 million posted in 1982. Corporate net income increased 24.2% to \$278 million from the \$222.4 million of 1982.

It seems that Tandy, like Apple, was suffering from IBMitis during 1983. Despite the natural advantage of its own retail outlet, with over 400 computer stores, Tandy's computer business was hurt by Big Blue. The new model 2000 was introduced in December, touted as being three times faster than the IBM PC and 25% cheaper. But few were available because of the shortage of its brain, the 80186 microprocessor from Intel.

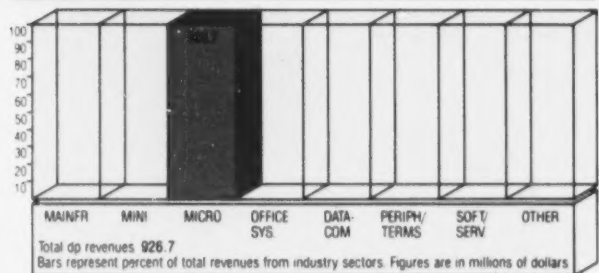
The 2000, available in two versions, has a main memory expandable to 768K RAM. The basic system, with 128K of memory and including two disk drives for storing 1.4MB, is priced at \$2,750; the version with a 10MB hard disk drive is \$4,250. Tandy claims the 2000 can read information on disks created on the IBM PC.

Tandy claimed to have a product that was compatible with existing packaged software; however, the Intel 80186 chip limited the machine to relatively few such packages.

Tandy had high hopes for the 2000, aiming it at IBM's traditional office turf and Tandy's weakest market. The company was counting on the 2000 to improve its consumer toy image and to slow the ascent of the IBM PC as the de facto industry standard. A number of software companies had promised to produce software for the 2000 to give it the extra push needed to stop IBM's momentum. IBM, however, remained supreme, because Tandy's machine didn't quite deliver the goods.

Ironically, Tandy's portable machine, the model 100, was a big success during 1983; many buyers picked up the inexpensive lap model as a traveling notebook. But many other companies have entered this business. If Tandy hopes to be a competitor in dp, it must develop a marketing strategy to outwit Big Blue and add to its profits column in a big way.

14



COMMODORE INTERNATIONAL LTD.

950 Rittenhouse Rd.
Norristown, PA 19403
(215) 666-7950

Commodore rode the crest of the micro wave to new heights in 1983. Corporate revenues increased 127% to \$1.04 billion, up from \$459.8 million in 1982. Earnings also skyrocketed 91.6% to \$126.1 million, up from \$65.8 million in 1982.

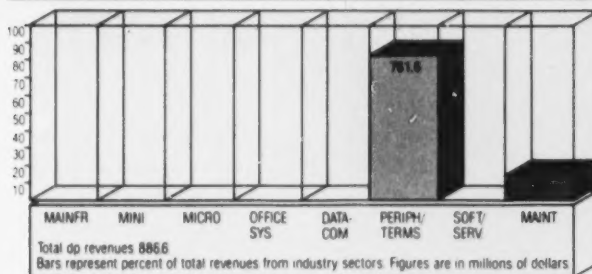
These gains were made while its major rivals were floundering in the price-cutting environment of 1983. Atari and Coleco were both having problems and losing money. Texas Instruments went for 10 rounds and then quit, a definite loser. Apple watched as its perfect earnings record went down the tubes. Commodore's success in the competitive year led one analyst to comment, "Commodore has out-Japanesed the Japanese."

Upon reaching the billion dollar sales mark, however, Commodore seemed to trip up. Founder and president Jake Tramiel abruptly resigned, and was quickly followed by four other top executives. The reason for Tramiel's departure was a disagreement with board chairman Irving Gould over a new executive hiree. The resignations sent tremors through Wall Street and the dp industry. As the dust settled, observers began commenting on Tramiel's well-known erratic management style and the furor seemed to die down. Analysts point out, however, that Commodore is poised for further expansion, and changes in the executive suite were not likely to derail the company.

During 1983, Commodore passed a number of milestones. One important one was in the software arena, in which Commodore has been weak. In June, the company introduced 70 software packages for its computers, all priced under \$100. Among them were the new Magic Desk, which competes with Apple's Lisa and provides users with an integrated set of functions, including word processing and file updating. Analysts predict these products should generate \$200 million in revenues in the next two years.

One well-known aspect of Commodore's success is its integrated manufacturing abilities and strategically placed plants. Another is its dedication to its independent dealers, as evidenced by the time Commodore, behind because of production problems, began overnight shipping at its own expense to get its product to its dealers. These dealers have paid Commodore back in loyalty. During 1983, a considerable number of new dealers were added to Commodore's network: K-Mart, Sears, and J.C. Penney have all agreed to carry the Commodore line.

15



STORAGE TECHNOLOGY CORP.

2270 South 88th Street
Louisville, CO 80027
(303) 673-5151

Murphy's law is alive and well and living—nay, thriving—at Storage Technology Corp. Whatever could have gone wrong during 1983, with scant few exceptions, did go wrong, at the worst possible time and in the most embarrassing manner. The year was, in short, an epic disaster of titanic proportions.

The financial results only begin to tell the story. After over a decade of steeply rising revenues and profits, culminating in 1982 with \$1.08 billion in revenues and net profits of \$64.7 million, revenues shriveled to \$886.6 million and profits evaporated completely. Net income totaled 3 cents per share in the first quarter, more than a 90% drop from the same period a year earlier. Then the picture got worse, with a profit of 1 cent per share in the second quarter and sizable losses—Storage-Tek's first ever—in the last two quarters. Over the year, the company lost \$40.9 million.

The firm's fortunes in general throughout the year were even worse than the financial nosedive. The late 1982 field replacement of defective head-disk assemblies in the 8650 disk subsystem cost the company a pretty penny early in the year, and endless delays on the 8380 disk drive line kept costs mounting through the year. The large-scale disk subsystem did not begin shipping in volume until the late fall.

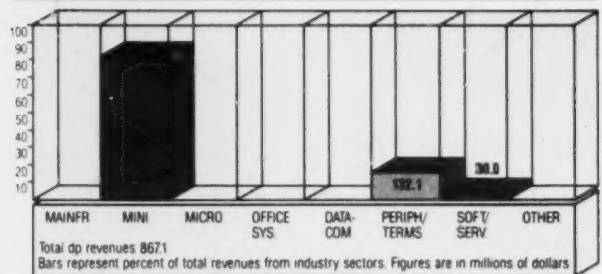
StorageTek had similar problems with both disk drive lines in 1982, but the firm's tape drive business was healthy enough to sustain the financial health of the company. In 1983, however, the tape business itself weakened, resulting in a \$9.4 million loss from continuing operations.

The lion's share of StorageTek's financial woes, however, is due to the steep development costs of two new products, an optical disk drive capable of storing 4GB per platter and a midrange mainframe computer. The optical drive was one of 1983's only bright spots, since it was announced on time and within the \$50 million budget raised by limited partners.

The mainframe project, though, was the most conspicuous of Storage Technology's many disasters during the year. It was designed to implement power and space-saving CMOS technology, but cost overruns and technical problems prevailed. StorageTek decided in January 1984 to cancel the cash draining project, resulting in an \$18 million write-off.

And if StorageTek's product woes weren't sufficient, the executive offices of the company became something of a revolving door, with several top aides to chairman Jesse Aweida resigning. Nonetheless, many analysts believe that StorageTek—which changed its logo from STC early in 1984 to avoid a trademark infringement suit—will rebound in the next few years because it is currently at the beginning of several product life cycles, which will generate more revenue as they age.

16



DATA GENERAL CORP.

4400 Computer Drive
Westboro, MA 01580
(617) 366-8911

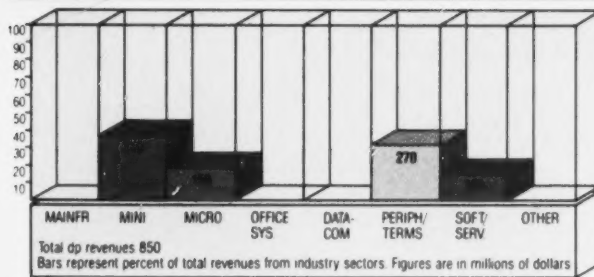
This time, mighty Casey did not strike out. Instead, with his back against the wall after two bad years, Data General ceo Edson de Castro hit a grand slam home run. The company's revenues climbed 7.9% to \$867.1 million; its net income leaped 125% to \$29 million; its operating margins turned sharply upward after hitting bottom in the fourth quarter of 1982, reaching 10% early in 1984; and its stock price increased by 350% since August 1982. So there is indeed joy in Mudville, and in Westboro, and on Wall Street, for Data General has roared back to life.

The company's financial success marked a major turnaround, as Data General resumed the upward spiral it enjoyed through the first decade of its life. Yet the extent of the turnaround is only partly measured by the financial results. It is also apparent in the firm's ability to attract nine new officers to the company to complement company founders de Castro and executive vice president Herb Richman, and in its products. Data General completely updated its superminicomputer line in 1983, snaring the technological lead from archival Digital Equipment.

The 32-bit Eclipse line, whose first member was introduced in 1980, three years after DEC created the market, was expanded at both ends with the top-end MV/10000 providing twice the power as the top-end DEC VAX-11/780 at about the same cost. The low end was extended with the MV/4000, and two MV/8000 models updated the midrange. The Eclipse MV line continues to account for the largest portion of Data General's revenues and is sold through both the oem oriented Technical Products division and the commercially oriented Information Products division.

Data General also introduced its second stab at the microcomputer market in 1983, the Desktop Generation line. The line ranges from a low-end model 10, comparable to many other pcs, to a high-end model 30 capable of running minicomputer applications. The systems can all run DG's AGS operating system, providing a family of completely integrated products from the low-end model 10 micro to the high-end MV/10000 supermini.

The firm was active on the software side as well, landing two of the largest software contracts in history. Both the U.S. Forest Service and E.F. Hutton signed multimillion dollar contracts to use the CEO line of office automation software. DG also combined with Rolm to offer one of the three certified Ada compilers currently available, and joined forces with both Northern Telecom and AT&T to offer computer-to-PBX connections.



TEXAS INSTRUMENTS INC.

P.O. Box 22574
Dallas, TX 75265
(214) 995-3773

The Yellow Rose of Texas turned bright red last year. Texas Instruments did indeed have a lot to blush about in 1983, when it was forced to bolt the home computer business, saddling the company with a whopping \$660 million pretax loss. Result: TI took to the debt trail, reporting a consolidated after-tax loss of \$145.4 million compared with net income of \$144 million.

TI's total corporate revenue inched up 6% to \$4.58 billion. The company claims its 1983 dp revenues crawled up a mere 1% to \$680 million after the pc fiasco. Most of the dp revenues stem from the minicomputer arena, which posted a 1% increase to \$330 million. Terminals and printers contributed \$260 million—down slightly from 1982.

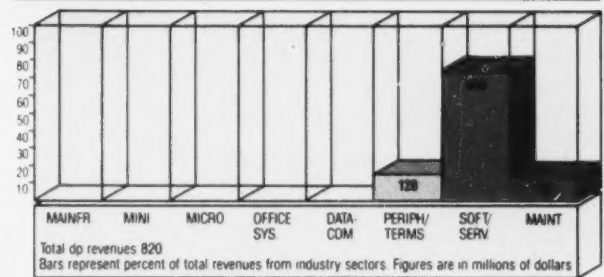
Overall, 1983 was a year of sluggish sales and shipments for one of TI's more dynamic divisions. Contradicting this trend was the TI Professional Computer. Sale of the system, which is aimed at the business market, continued strong throughout the year, especially in the last quarter. TI's Business Systems series minicomputers didn't fare as well, reflecting the general trend in the industry. Nevertheless, sales of the mini began to pick up in the second half of 1983. The company itself admitted year-end results for its digital systems operation were depressed by new product development and marketing costs.

The digital products sector, however, was a veritable gold mine compared to TI's consumer electronics group. There were no happy trails, only tears for TI as it slashed the price of its ill-fated 99/4A home computer below \$100. This drastic move didn't help earnings; sales of the system and its associated peripherals and software continued to drop last year, and operating losses continued to mount.

Then finally it happened. The eyes of Texas and the world were on TI as it gloomily announced its withdrawal from the home computer business on Nov. 1. Following that announcement the company summarily fired 1,000 employees at its Lubbock, Texas, plant, the home of TI's troublesome home computer. In abandoning this market, the company is also abandoning a concept that it can truly be successful in the consumer marketplace.

Helping to mitigate against this disheartening loss was good news on the semiconductor front. Like other semi manufacturers, TI was greatly helped in its semiconductor business by the overall market recovery. Decent sales were also reported by the company's defense electronics operation.

Having tossed out its earnings sponge—the home computer operation—the giant electronics company is now free to get on to more profitable business pursuits. Leading TI in that pursuit will be J. Fred Bucy, succeeding Mark Shepherd Jr., who retired as ceo.



GENERAL ELECTRIC CO.

3135 Easton Turnpike
Fairfield, CT 06431
(203) 852-8200

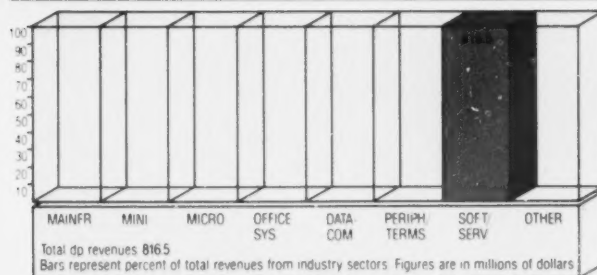
Despite the economy's general improvement, General Electric continued to have difficulty in 1983. Revenues picked up 1% after a 3% drop in 1982, finishing at \$26.8 billion on the year. Net income increased 11% to \$2 billion from \$1.8 billion in 1982. Even those modest increases were substantial compared to GE's dp business segments in 1983, however. Revenues from dp fell 5%, to \$820 million from \$862 million. And while the firm would not be specific, it did report that net income for the dp-related businesses was also sharply lower on the year.

By far, the largest portion of GE's dp business is the General Electric Information Services Co. (GEISCO) subsidiary, where 1983 revenues dropped 8.5% to \$600 million, from \$655 million in 1982. In large part, that drop reflects the general decline of the timesharing industry as in-house computing capabilities increase; it also reflects a change in GE's strategy. GEISCO's greatest source of revenue continues to be the Mark III teleprocessing network, the world's largest such commercial network, but GE is shifting its emphasis to distributed computing services provided by the network. This shift comes from GEISCO's attempt to tie personal computers into Mark III. In January, GEISCO became an IBM value-added dealer so it could sell its customers IBM PCs; it then enhanced Mark III to accommodate—and encourage—the use of pcs rather than terminals.

The results of that strategy shift are apparent in GE's 4% gain in peripherals revenues, to \$120 million, as users began shifting to the high-ticket pcs rather than the cheaper terminals. The peripherals revenues were also aided by a micro-to-mainframe communications board sold by GEISCO's subsidiary, Software International Corp., which provides financial software products for both micros and mainframes. The Smart-Link hardware/software combination for linking pcs to central hosts was introduced in February.

General Electric also manufactures and sells the Calma line of CAD/CAM/CAE design equipment. Calma recorded an 8% gain in 1983, to \$100 million, as the CAD/CAM industry continued to grow explosively. Calma broadened its electronic design software offerings by acquiring TEGAS Systems, a computer aided engineering software firm.

19



AUTOMATIC DATA PROCESSING INC.

One ADP Boulevard
Roseland, NJ 07068
(201) 994-5000

ADP is the only company in the industry to have produced its own U.S. senator, founder Frank Lautenberg. More impressive, however, ADP has achieved earnings and revenue growth of over 10% for each of the last 23 years, a record unmatched by any other company listed on the New York Stock Exchange.

Last year, the company's total revenues hit \$816.5 million, up 15.9% over 1982. Net income rose by 14.5% to \$68.7 million. At year's end, the corporate purse was plump: \$52 million in cash was on hand.

Research and development costs hit \$29.5 million last year, an increase of 18%. Some of this increase was due to the company's expansion of its brokerage services from the back office into the front office. Quotron, the longtime leader in front-office information distribution, is already said to be feeling the heat of ADP's foray into this market. Prudential-Bache is working with ADP on this project, but ADP will be free to market the service to the financial industry just six months after Prudential-Bache goes on-line.

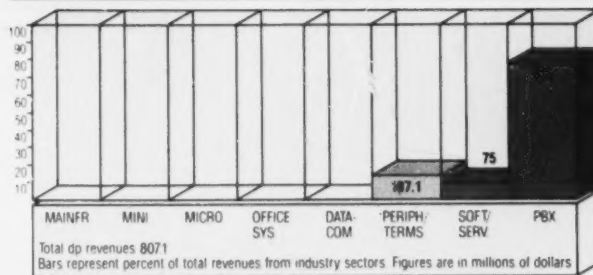
ADP's acquisitions last year also demonstrated the important place brokerage services will play in its future: in June it bought Computer Information Service Inc. (CIS), and in August, GTE Telenet Information Services. CIS is a veteran supplier of back-office, record-keeping services to brokers and traders, and CIS delivers database and quotation services for the brokerage and investment community. ADP says these acquisitions will "accelerate" its development of an interactive workstation for sales, trading, and operational personnel in the securities industry.

About a third of ADP's income comes from its payroll business, an area that has recovered from the staff reductions with which many of its client industries responded to the recent recession: there are more customers and the average number of employees on each payroll has increased.

Electronic funds transfer is one area of ADP's business that still hasn't made any money. Losses of between \$300,000 and \$400,000 per month were common last year. But the company says it will stop losing money there by the end of 1984.

When the silver-haired, silver-tongued Lautenberg left for the marble pastures of D.C., there were some who feared for ADP. Better they should have bought stock.

20



AMERICAN TELEPHONE & TELEGRAPH

550 Madison Ave.
New York, NY 10022
(212) 393-9800

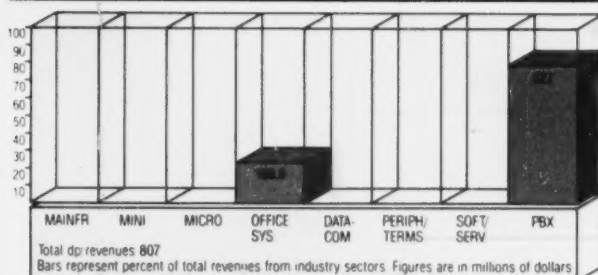
What a difference a year makes. As the crowds milled in Times Square to ring in 1983, we still had Ma Bell to kick around. Twelve hours later, a multibillion dollar subsidiary called American Bell was weaned, and vice president Archie J. McGill introduced AT&T's first digital PBX. Six months later, McGill was gone. By the time the crowds milled in Times Square to ring out 1983, American Bell was gone too, and so was Ma Bell's venerated Bell System. In the end, the familiar names of Long Lines, Western Electric, Bell Laboratories, and Teletype had either been obliterated or obscured; we now have AT&T Communications, AT&T Technologies, AT&T Information Systems, AT&T Bell Laboratories, and AT&T Teletype. All of this left the accountants with the nightmarish task of sorting out Ma Bell's finances.

Those finances, as it turns out, were less than overwhelming. AT&T's 1983 corporate revenues came to \$69.4 billion, a 7% rise from 1982, while 1982's \$1.5 billion net income became 1983's \$4.9 billion net loss. Early in 1984, AT&T ceo Charles Brown announced that for the first time in history AT&T's earnings could not cover its declared dividend, but it would be paid anyway. Future dividends were left in question.

The dp side was no better, with revenues outside AT&T gaining 1% to \$807.1 million. Bell's revenues from the Unix operating system and a host of applications software packages were flat on the year at \$75 million, and AT&T's PBX business picked up a mere 4%, to \$625 million. DATAMATION estimates that upwards of 90% of that PBX business was for analog switches, with the System 85 voice/data digital switch pulling in the remainder.

The Teletype subsidiary's sales outside AT&T of terminals and data communications equipment fell 7% to \$95.8 million, and its maintenance and repair revenues dropped 47% to \$11.3 million. The drops are due more to an increased percentage of sales into the Bell System—to 71% in 1983 from 62% in 1982—than to weakness in the business. None of AT&T's approximately \$600 million worth of 1983 sales of the 3B series of minicomputers were included in its dp revenues, because the hardware was sold exclusively into other parts of the massive company. Those sales will be included in 1984 because of the divestiture of the local operating companies—the largest users by far of the 3B line—and the March 1984 announcement that the line would be sold to others outside AT&T.

21



NORTHERN TELECOM INC.

259 Cumberland Bend
Nashville, TN 37228
(615) 256-5900

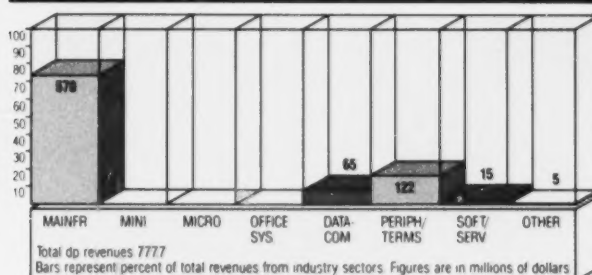
Northern Telecom's acute embarrassment in the computer industry finally ended last year. The Canadian telecommunications hardware vendor bought several U.S. data processing companies in the late 1970s in the hopes of meshing their terminals and cpus with its PBXs and other gear and creating the office of the future available from one vendor. Instead, it lost key dp designers and marketers, customers, and money. In 1983, however, the hemorrhaging ended when the company announced that the last consolidation of its dp operations, into an Electronic Office Systems (EOS) group, led to break-even or marginally profitable operations at year-end.

Included in Northern's \$1.9 billion in sales is about \$180 million in terminals and other office hardware and \$627 million in digital PBXs that switch voice and data communications; the rest of the revenues represent specialized switches for telephone companies. Corporate net income soared last year 93% to \$268.4 million, in part due to the carrying forward of tax losses from prior years and the economies of scale in its PBX business, increased sales to the Bell operating companies, and the cauterizing of the losses at EOS. R&D funding was sharply boosted, to \$324 million from \$241 million in 1982, as the company continued its efforts to make its PBXs and other hardware compatible with dp equipment made by other firms.

This "open world" policy provided for bridges to hardware built by more successful dp players, such as Digital and Sperry. The company's PBXs now include optional cards for handling IBM PC transmissions and moving analog data to other areas of an organization without modems.

After shoring up the weaknesses in its EOS, the company began a new disk and tape drive venture in Ann Arbor, Mich., site of one of the companies folded into Northern six years ago. If the company is to meet its goals of increasing revenues and earnings by more than 25% this year, its ventures in the dp business must be more successful than in the past.

22



AMDAHL CORP.

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Sunnyvale, CA 94086
(408) 746-8510

Everything came together for Amdahl in 1983 as the company hit new highs in revenues and earnings. Revenues soared 68%, to \$777.7 million, on the strength of demand for the Model 580 family of IBM plug-compatible mainframes. It was the earnings side, however, that showed the most improvement—net income up 621% to \$46 million. Only \$3.2 million of that was an extraordinary gain; the rest was real profit. Amdahl's earnings were very depressed in 1982 owing to production and reliability problems with its new large-scale processors. Once Amdahl solved these problems, it began to reap the benefits.

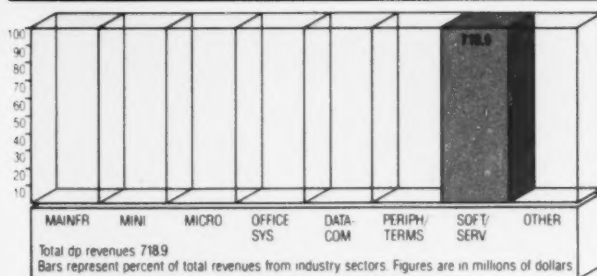
The uniprocessor 580 and its dual-processor siblings, the 58xx series, were subject to the usual combination of turbulence from IBM and skittishness from customers. A major reliability problem with the processors was resolved in what one observer called a mind-boggling troubleshooting effort.

By year-end the company had shipped about 200 processors, including the last of the old 470 systems. Estimates of 1984 processor shipments start at around 50% over the 1983 level, indicating that Amdahl may survive the short-term impact of price cutting announced by IBM late last year for its big machines.

Over the long term, the 10% or so price reductions for 308X series machines are expected to be a big challenge for Amdahl sales personnel, or at least until a new big processor box is introduced to reestablish the typical price/performance trade-off Amdahl has enjoyed in the past. Pressure on the company's order books for the new Sierra line from IBM will no doubt increase the suspense about whether the plug-compatibles have a promising future.

Wall Street analysts are particularly happy with Amdahl's success in the disk business. They estimate that Amdahl, which started with nothing in 1982, shipped close to \$100 million worth of Fujitsu's Eagle disk drives during the year, and they expect the company's peripheral business to increase to \$250 million to \$300 million in 1984, partly because of rising sales of data communications gear.

There were rumors during 1983 of a possible AT&T-Amdahl marriage, but Fujitsu, which has owned 30% of Amdahl for years, recently upped its stake to 49.5%, putting an end to such rumors. The Fujitsu disk drive connection in 1983 showed just how profitable Amdahl could be. More technological exchanges are expected in the future.



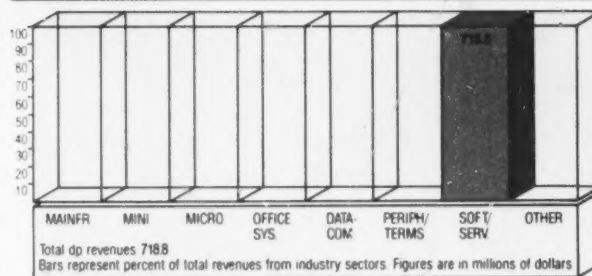
COMPUTER SCIENCES CORP.

650 N. Sepulveda Blvd.
El Segundo, CA 90240
(213) 615-0311

Computer Sciences slogged through an off year despite a 5% increase in revenues, to \$718.9 million from \$683.4 million. Net income was off nearly 20%, to \$15.9 million from \$19.7 million. Part of the problem was that the firm spent almost as much time in the courtroom as it did in the boardroom. It won a \$1.5 million settlement against Itel Corp., but spent \$4 million in a separate case, related to a completed contract with the U.S. General Services Administration for remote computing services. The company also suffered because of the continuing decline in the use of timesharing services experienced throughout the industry. CSC sold some accounting services in September to hasten its exit from the timesharing business.

Computer Sciences breaks its business into two segments, data services and contract services. The data services operation provides customers with remote dp services using proprietary packaged software and the Infonet timesharing network. Revenues in this area continue to climb slowly, but income has been evaporating, dropping from a pretax high of \$24.8 million in fiscal 1980 to \$6.8 million last year. Despite the fall, there were some bright spots for the data services operation. It completed the upgrade of its Sperry mainframes ahead of schedule, and boosted its IBM systems as well. Applications on the Infonet service include credit reporting, tax processing, payroll, accounting, and distribution management services.

The contract services operation picked up strongly in 1983 after a lackluster 1982. The operation provides custom-designed computer and communications systems, support of client technical activities, and management of client computer facilities. It also develops and markets turnkey systems for government customers. CSC was particularly strong in dealing with the Defense Department last year, securing several contracts for command and control, weapons systems, communications, simulation, training, logistics, and management coordination. CSC teamed with Sperry in 1983 to win the largest dp contract ever awarded, a \$476 million pact with the Air Force.



ELECTRONIC DATA SYSTEMS

771 Forest Lane
Dallas, TX 75234
(214) 661-6177

Apparently, last year EDS chairman Ross Perot engineered not a single international jailbreak. In 1983, the headlines earned by EDS were all on the business pages. Total corporate revenue rose from '82's \$562.6 million to \$718.8 million, up almost 28%. Net income rose by just a hair less, a little over 27%, from \$53 million to \$67.4 million. While things haven't been so wonderful for some companies in computer services, this firm has been growing steadily for almost a decade, and has paid its stockholders—Perot, the largest, holding 29% of the shares—handsome dividends since 1973.

A lot of EDS's new business in 1983 continued to come from contracts with local, state, and federal government agencies. In fiscal 1983, fully 24% of EDS's revenues came from deals with federal agencies. (EDS's \$656 million deal with the U.S. Army, signed in 1982, is the largest single contract ever awarded in the computer services industry.) In October, for example, the U.S. Postal Service signed EDS to a seven-year, \$200 million contract to support airmail. In addition, Medicare and Medicaid programs in Alabama, Colorado, Florida, Idaho, Mississippi, Tennessee, and Texas will use EDS facilities. EDS has deals with welfare agencies in Mississippi, New Jersey, and New York and will support New York City's Welfare Management System. Further government contracts were signed with the Departments of Interior, Energy, and Agriculture, the U.S. Navy, the U.S. Army, the National Institutes of Health, the Social Security Administration, and the Immigration and Naturalization Service. While "big government" is not politically popular, it has demonstrable charms for EDS salespeople.

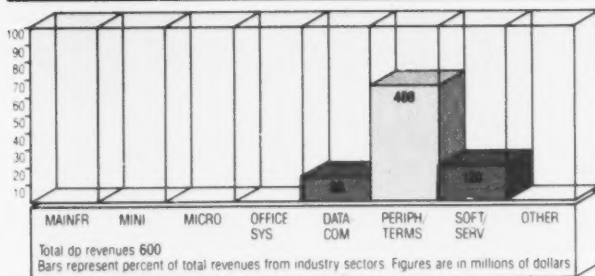
Another big customer for EDS has been the nation's banking and thrift industry: during the third quarter of '83 alone, EDS signed contracts with 79 new credit unions, and added 22 banks and several existing customers to the user list of its Inform community banking service.

Among EDS's 1983 acquisitions were credit union processing companies in Virginia, Wisconsin, and Texas; the U.S.-based business of Datacrown, a Canadian teleprocessing service; and the data center operations of Computer Usage Corp.

One entry on EDS's balance sheet raised further memories of the company's involvement in Iran: in June, after two years of negotiations, EDS managed to collect a \$16.5 million court judgment from the Khomeini government for work that had been done for the Shah's Social Security Organization.

Between new business and old, EDS has about \$2.8 billion in confirmed orders on its books. Scheduled for delivery over the next few years, this business should ensure that EDS's annual revenue gains will continue to be robust.

25

**ITT CORP.**

320 Park Ave.
New York, NY 10022
(212) 752-6000

An idle viewer of ITT's ubiquitous television commercials might assume it had invented everything up to and including sliced bread. But if it didn't invent everything, it certainly seems able to sell everything. Nestled among the other businesses of this largest of conglomerates was about \$600 million in 1983 sales of dp and terminals, about 14% over its 1982 level. The dp upturn looks even better when viewed against a 4% drop in overall corporate revenues, down to just over \$20 billion from \$21 billion. Despite the downturn, profits were up 1.8% to \$674.5 million, partly because the company continues to trim its huge staff, now hovering at just about 278,000.

(One very visible change at ITT in 1983 was its new name. The International Telephone and Telegraph Corp. dropped everything but the acronym by which it had been known for years, and ITT now stands for nothing more than ITT.)

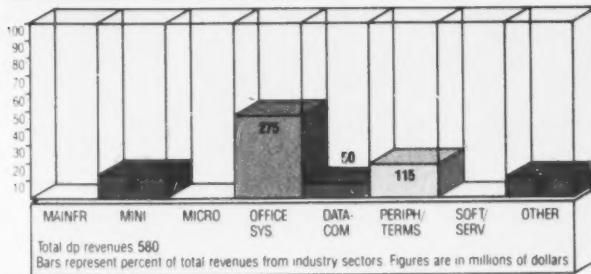
Data communications accounted for a little over 13% of ITT's dp revenues last year, about \$80 million, and this segment of ITT's business is expected to grow if access to its new packet switched network increases. Announced last summer, the network can now be used by customers in five cities, and while the company says more cities will be added by the end of 1984, the network has grown more slowly than expected.

Qume, the San Jose-based maker of printer and memory devices that ITT bought in 1978, is estimated to have about \$200 million in revenues. But profits in this field are under intense competitive pressure: early this year, Qume announced its last domestic factory would close and manufacturing would move to existing plants in Taiwan and Puerto Rico.

ITT Courier Terminal Systems announced late in '83 it would be selling an IBM PC lookalike, the Xtra, with shipments to begin around tax time this year. Deliveries were delayed and the first machines should be reaching stores as you read this, priced just under IBM's machine. It's expected Xtra will do better in European markets where ITT's dealer network is strong and well established.

Whether or not Xtra adds much extra cash to ITT's bottom line, this year will probably mean increased sales for the company because of the AT&T breakup. With the regional Bell operating companies forced to seek hardware from sources other than Western Electric, ITT's new digital switch could add more customers. Southwestern Bell has already ordered \$30 million worth of telephones from ITT. So the company that began decades ago when AT&T divested its foreign operations could do almost as well out of the current divestiture.

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**HARRIS CORP.**

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Melbourne, FL 32919
(305) 727-9100

The news from Harris headquarters is mixed. For calendar 1983, total corporate revenues increased 6.1% to \$1.64 billion while net income dropped 6.4% to \$68 million. These results, however, are difficult to compare because of the 1983 merger with Lanier Corp.—Harris hasn't restated its results for 1982 with the inclusion of Lanier as yet, and therefore these figures could change. DATAMATION estimates that dp revenue for the combined company reached \$580 million, including an estimated \$275 million from Lanier's word processing line.

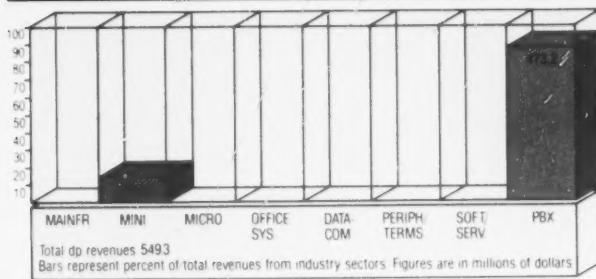
The merger with Lanier was done on a stock swap basis, but the value of the deal was about \$275 million. Wall Street skepticism about the merger pushed Harris stock down; since then the stock has recovered.

Harris is divided into five operating groups. The largest of these is the government sector, which contributes about half of Harris's total revenues. The communications sector, with a large portion of its sales overseas, particularly in developing countries, has had depressed revenues. Harris is therefore trying to redirect its marketing efforts toward developed countries, particularly the U.S. The semiconductor sector is experiencing increased sales as demand grows. Harris is in a particularly good position in semiconductors because it has redirected its product line away from the competitive RAM market and into the 16-bit CMOS microprocessor market.

The information systems sector, which is primarily data processing, has problems, the main one being the terminal business that DATAMATION estimates was relatively flat for calendar 1983 with sales of \$115 million. Another factor hurting the information systems sector was its dependence on overseas business, where the ongoing recession caused sluggish sales for Harris.

In Lanier's Atlanta headquarters there has been good news. This manufacturer of dictating machines and word processing equipment has been successful with its latest line of wp equipment after switching from a line manufactured by another firm.

Wall Street analysts remain skeptical about Harris's future in dp. The big question is, how will the merged companies combine Lanier's marketing ability with Harris's technology to become a strong contender in the office automation market? It will take two or three years to answer that question.



ROLM CORP.

4900 Old Ironsides Rd.
Santa Clara, CA 95050
(408) 983-2900

There is an old Chinese curse to the effect, "May you live in interesting times." Rolm certainly found 1983 to be interesting. Revenues continued to rise, income was up, major new products were announced on schedule, lawsuits were begun and completed with minimal disruption of business, and, oh yes, IBM deigned to take an interest in the company.

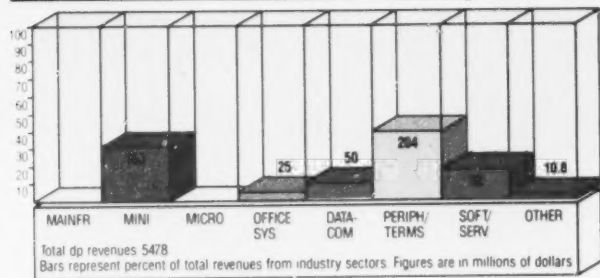
For the year, revenues climbed 23% to \$549.3 million while earnings inched upward 3.3% to \$34.1 million. While still healthy—especially considering Rolm's size—1983 did mark a slowing from previous years. In 1982, by comparison, Rolm's revenues grew 35% over the previous year and income jumped 26%. A significant amount of would-be net income was invested in R&D, which jumped to \$41.3 million, 42% more than 1982.

Both of Rolm's primary businesses fared well during the year. The Mil-Spec division, which sells minicomputers to the military, saw a 22% gain in revenues, to \$76.1 million. The business communications division, which is the CBX family of private branch exchanges, grew 23% to \$473.2 million.

The CBX business hit the headlines several times throughout the year. In February, Rolm sued Plessey Telecommunications Ltd., a British firm that Rolm said misused Rolm technology and copyrighted software. Rolm sought to enjoin Plessey from selling a PBX it said was based on the CBX, and asked for \$100 million in damages. By November, however, the two sides had agreed to an amicable settlement in which Plessey would pay Rolm an undisclosed amount for a licensing agreement so that the former could continue to sell its PBX products.

Also in November, Rolm introduced the first major revision of the CBX switch, called the CBX II. The product will replace four of the five types of switches Rolm sells. Its largest configuration can handle 4.4Gbps, which gives users ample room for future expansion of their voice and data communications networks. The CBX II family is completely compatible with the CBX family, which was limited to 740Mbps. Rolm said the CBX II, which cost \$80 million to develop, will eventually account for 70% of its corporate revenues. By comparison, the CBX family currently accounts for 86% of corporate revenues.

The news that got Rolm the most headlines during the year, however, was its partial purchase by IBM. The leading computer maker agreed in June to purchase less than 30% of the company, and as of early 1984 had 19.1% of the shares of the company and two representatives on Rolm's nine-member board of directors. Both companies were developing ways for IBM computers of all sizes to communicate over Rolm data communications switches. That intent was apparent even in February, when Rolm announced a gateway product that allowed the CBX to connect into SNA networks.



DATAPoint CORP.

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San Antonio, TX 78284
(512) 699-4428

Datapoint returned to profitability during 1983, but the disastrous accounting scandal took its toll on the company. Revenues for calendar 1983 rose 6.8% to \$547.8 million, from the \$512.9 million reported a year earlier. Earnings increased also, but were far from Datapoint's historical levels. The company posted earnings of \$13 million for calendar 1983 vs. the loss of \$7.9 million in 1982.

The accounting scandal of late 1982 took Datapoint and Wall Street by surprise. The company responded by firing a number of executives, and taking huge writeoffs during the year. Time spent on financial problems would have been better spent on new products, because Datapoint lost some of its competitive edge in a number of markets. The next generation of products isn't due out until mid-1984 and will not help the company much during 1984.

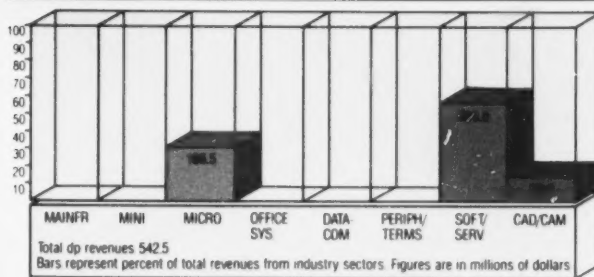
New products in 1983 were limited to enhancements of the existing product line. For example, at the lower end, Datapoint announced the 1560 Small Business Computer System, an entry-level system that can expand from a standalone system to multiple interconnected processors on an attached resource computer or local area network. Datapoint also upgraded its 8600 series system with the lower-cost 8625, the 10MB disk, 1MB diskette system. Late in the year, Datapoint introduced the 8640 system, which features 512K memory, and adds a new disk system expandable to 130MB.

To make sure another scandal never darkens its doors, Datapoint brought in a number of new executives from such classy companies as Data General, Motorola, Sperry, Digital Equipment, and Xerox.

Datapoint also divested itself of a few subsidiaries during 1983. It sold its subsidiary in Denmark and its 50% interest in Texas Peripherals to its partner, Tandy. In addition, Datapoint transferred the assets of its money-losing Communications Products Division to a new entity. Datapoint retained a minority interest in the new company.

Datapoint's management kept a tight lid on expenses during 1983, but did increase R&D a bit to \$47.3 million, up from \$44.6 million in 1982. Obviously management is hoping that new products will pull the company out of its doldrums.

29



MCDONNELL DOUGLAS CORP.

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St. Louis, MO 63166
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Everything was up, up, and away for McDonnell Douglas Automation Company (MCAUTO). Even Wall Street's disapproval of the parent company's acquisition of Tymshare couldn't alter the company's direction.

The statistics went only one way. The bottom line on total corporate revenue was \$8.1 billion, an 11% increase over 1982's \$7.3 billion. Net income more than doubled that performance, rising 28% to \$274.9 million from \$214.7 million.

Dp was a major player in this movie. Total dp revenue from commercial sales also went up, jumping 14% to \$542.5 million from \$476.4 million. Total dp revenues, including sales to internal divisions, reached \$780.5 million, a 4% increase over 1982's total of \$747.9 million. There was much cheering over MCAUTO's commercial revenue performance. That rose 15% to \$376 million. Thus MCAUTO accelerated the 1982 trend of selling more to outsiders than insiders.

McDonnell's other dp arm, Microdata, also had a good year. Sales were up 12% to \$166.5 million from \$148.1 million. Unigraphics, the company's CAD/CAM system, won the gold star: sales jumped 47% to \$70 million.

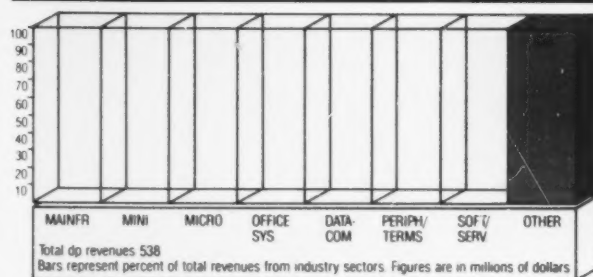
Not content with playing a pat hand, both MCAUTO and its parent added significant new cards to their deck. MCAUTO in May bought the assets of Insight Technology, Whitinsville, Mass. Three months later, MCAUTO acquired a minority interest in Sanus Corp. Health Systems.

These acquisitions were part of a grander scheme, which culminated with the purchase of Tymshare. McDonnell Douglas had been coveting the timesharing company since November. The two parties had actually agreed—at least in principle—to a deal wherein McDonnell Douglas would pay \$31 per share for Tymshare. That deal fell through about a month later. But the two resumed discussions early this year, which eventually led to McDonnell Douglas's forking over \$25 per share.

McDonnell Douglas then played its trump card. It announced in March the formation of an Information Systems Group, composed of MCAUTO, Vitek, and Microdata. Tymshare will be added as soon as the paperwork is straightened out. The new group is chaired by McDonnell Douglas president John McDonnell.

The group expects sales to reach \$1 billion in 1984. A large portion will undoubtedly come from the newly formed McDonnell Douglas Health Systems, which includes MCAUTO's Health Services Division and Vitek. The Health Services Division provides dp services to one out of every five hospitals in the U.S. Vitek alone serves 330 hospitals in the U.S. The company clearly expects those numbers to rise, just as its performance did in 1983.

30



COMDISCO INC.

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Rosemont, IL 60018
(312) 698-3000

Comdisco has existed as a flea on giant IBM's back, and 1983 proved to be a bumpy ride for the computer leasing company. For one thing, the giant became a direct competitor to Comdisco, as IBM stepped up its leasing activity with a partnership of two financial powerhouses, Merrill Lynch and Metropolitan Life. Despite this new competition, Comdisco's performance for calendar 1983 appeared good: revenues increased 9% to \$538 million, and earnings soared 52% to \$49.0 million from \$32.2 million a year earlier.

Behind these numbers, though, linger big problems for Comdisco. The roof fell in October, when a magazine article questioned Comdisco's accounting practices and the whole process of third-party leasing. The power of the press was immediately apparent. Leaseholders got nervous and stopped leasing. The IRS got curious and began investigating. And shareholders got scared and started selling. By February, when the annual meeting took place, the stock had dropped 70% of its value, and first-quarter earnings were off 25%.

Kenneth Pontikes, founder and chairman, explained at the annual meeting that the questioned practices only accounted for 12% of Comdisco's total revenues in fiscal 1983, but that hasn't convinced investors—the stock still languished in the low teens, from a high of \$40.

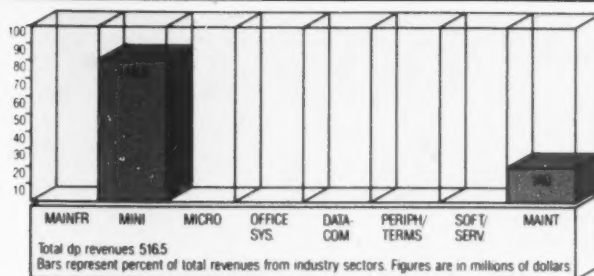
Security analysts remain optimistic. They say that if the tax shelter aspect of such deals can't be sold, then the leasing industry will, in the long term, raise rates to compensate for the loss of revenue. As John Keefe of Drexel Burnham Lambert explains, "Right now there is uncertainty, and how long this will last is hard to say, but Comdisco's basic strengths are strong."

Comdisco introduced new products that don't rely on the tax shelter approach. One program permits a customer to shop around and pick out the equipment that it wants; then Comdisco purchases it and leases it back to the company. This gives the lessee much more control over the equipment it uses. Another program allows a customer to test IBM's new extended architecture equipment before committing to a purchase.

One of Comdisco's big hopes has been long in materializing. The Disaster Recovery Service division, hot sites filled with IBM mainframes and available in case of a disaster, remained in the red in 1983. Pontikes, however, predicts a profit for 1984.

With 1983 ending up a very volatile year for Comdisco, the company faces many unknowns, which will certainly test Pontikes's management skills.

31



PRIME COMPUTER INC.

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(617) 655-8000

Prime found 1983 tough going. Revenues were up a respectable 19% to \$516.5 million, but earnings fell 27.6% to \$32.5 million from the \$44.9 million of 1982. Most of the earnings slack came early in the year, as Prime struggled to get costs under control. One move to cut costs involved the direct sales force, since the number of branch offices were cut from 44 to 58. In addition, a number of sales management layers were eliminated to centralize selling to major accounts.

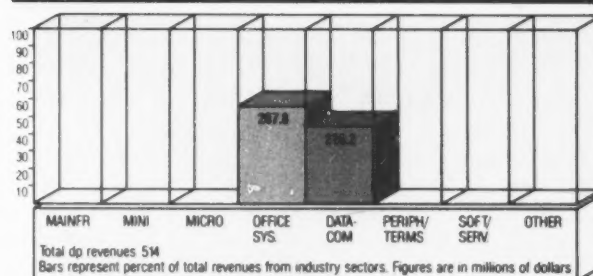
These moves were of limited financial success during the year, in part because of the tremendous competition in the mini-computer market. Data General currently has the price/performance lead with the MV/10000 and is putting a great deal of pressure on the market. Sales of Prime's high-end 9950 super-mini were strong after its midyear introduction, and analysts estimate this machine now represents about 20% of total volume. The earnings decline does show that Prime's prior premium pricing approach is now softening. The 9950 was also the first commercial minicomputer to use emitter coupler logic (ECL) chips, though other companies soon followed.

Prime's fastest growing business is in the CAD/CAM market, which analysts expect to remain hot in 1984. Prime acquired the Medusa (solids modeling) and other software packages, such as EDMS (electrical design) and PDMS (plant design), and they are considered critical to the company's long-term future. Indeed, Prime's CAD/CAM revenues are now less than 20% of the total but could exceed 40% in the next three years if the company's planned efforts are successful.

Prime faces a much tougher environment than ever before. How its 9950 supermini will stack up against DEC's forthcoming top-of-the-line entry remains to be seen. The company is also facing a number of unknowns in the small supermini market, where its model 2250 faces DEC's MicroVAX models and Data General's MV4000, formidable competition both.

The company lost a number of senior sales and research people last year, as president Joe Henson revised the corporate culture to reflect a more mature organization. Several of Prime's former executives left to form other companies now in the supermini business, but Henson is optimistic about the company's future: "During 1984, we plan to continue our aggressive new product introduction schedule, and our strategic investments in R&D, customer service, and marketing programs. We believe our investments in 1983 have positioned us well to benefit from an improving economy."

32



MOTOROLA INC.

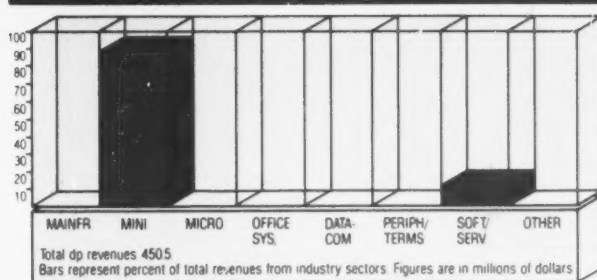
Motorola Center
1303 E. Algonquin Road
Schaumburg, IL 60196
(312) 397-5000

Motorola's semiconductor business drove its revenues and profits in 1983: last year's operating profits from chip sales exceeded the company's whole pretax income for 1982. Net sales hit \$4.33 billion, up just over 14% from the year before, and net earnings were \$244 million, up 37%. Dp revenues—from office systems and data communications—kicked in \$514 million to total revenues but contributed little or nothing to profits.

The Codex Corp., Four-Phase Systems, Universal Data Systems, and the International Division make up Motorola's Information Systems Group, and in 1983 the information wasn't terribly cheering. Four-Phase discontinued a line of central processing equipment in the fourth quarter and the resulting \$11 million write-off produced a \$5 million loss for the group. Despite a big order from the IRS and in-house optimism about MAESTRO, a software development system built by the European software house Softlab, the news from Four-Phase is expected to remain gloomy for a while longer. An expected strong performance from Codex and a probable improvement in international trade, however, should help boost the group out of the red for 1984.

The news from Motorola's communications businesses was better, but not thrilling: profit margins that had traditionally held at about 12% dropped last year to 5.7%. But a turnaround that began in the third quarter and intensified in the fourth quarter suggests that much rosier reports will be written about 1984's performance. Sales of Motorola's early entry in the advanced car-telephone sweepstakes are encouraging. Certainly, Motorola means to buy a hunk of future success: it accelerated its communications R&D investment by 24% in 1983. (Overall corporate R&D spending rose to \$336 million from 1982's \$278 million, an increase of just over 20%.)

Motorola's Communications Group is the source of a marketing victory that has cheered other companies faced with competition from the Japanese. The battle ground: pagers. When the intrusive little devices took off, the Japanese moved in. But Motorola fought back, and the pager remains an item in the American profit column.



TANDEM COMPUTER INC.

19333 Vallco Parkway
Cupertino, CA 95014
(408) 725-6000

The days of runaway growth have slowed for Tandem Computer. Last year the Cupertino company's dp revenues, according to DATAMATION estimates, were up only 34% to \$450.5 million, compared to the 41% and 88% gains posted in 1982 and 1981, respectively. That 34% increase is still nothing to sneeze at.

Tandem is indeed in the pink of health—an examination of its finances proves that. Helping out those finances is mini-computers, which continue to be the mainstay of the company's business. In 1983, Tandem's total revenues in that sector were up 28% to \$400 million.

A pioneer in the fault tolerant systems field, Tandem was in the black in its third year in business. And that business began booming. That boom was reflected by the company's phenomenal growth rates—growth that has gradually tapered off in the past few years. Also getting smaller are the company's inventories. Last year, Tandem launched a major effort to reduce its high inventories, a move that caused its per share earnings to dip slightly.

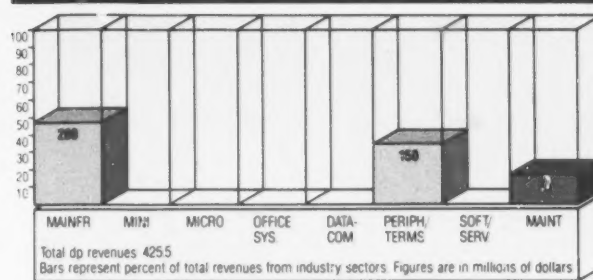
Tandem also increased capital spending and enlarged its sales force, setting up a separate federal government sales division. There was no such expansion drive in Europe, where Tandem decided to consolidate its operations, which pull in approximately 24% of the company's revenues.

On the manufacturing front last year, Tandem opened up a new automated facility for board assembling and testing in Watsonville, Calif. It also opened up an LSI lab for prototype chip development.

The company continued to be one of the major players in the on-line transaction processing market—a market that is expected to be worth a whopping \$28 billion by 1986. Tandem's 16-bit NonStop line of fault tolerant systems, introduced 10 years ago, got a big piece of that action, and its new 32-bit line of processors, the TXP, is doing well. Since then, the company has steadily increased its customer base. Last year it signed up 126 more customers, 47 of them in the fourth quarter.

To enhance its fault tolerant family, the company came out with Fox, a fiber optic extension that can tie up to 224 NonStop processors into a local area cluster. On the software side, Tandem announced the Snax package, which enables its Expand network customers to access SNA facilities.

More than 75% of Tandem's NonStop systems are sold to end users who develop their own application programs. The remaining 25% are oems and hardware/software development companies. Tandem seems to be putting more emphasis on the software side. Last year it launched the Alliance program to strengthen its relationship with software houses, and further insulate it from the recent entries in the fault tolerant market.



NATIONAL SEMICONDUCTOR CORP.

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The sharp turnaround in the semiconductor trade left National Semiconductor Corp. gloating over its revenue gains. And rightly so. Following two successive years of disheartening losses, National Semi finally returned to profitability in 1983, with net earnings skyrocketing threefold to \$24.2 million.

National Semi's dp revenue in 1983 rose 16% to \$425.5 million. The bulk of those earnings stemmed from the main-frame side, which posted a 14% revenue increase to \$200.5 million. Responsible for this revenue rise is National Semi's National Advanced Systems unit, which peddles Hitachi's medium- and large-scale IBM compatible systems. National Semi also derived some additional revenue on the peripheral side from Hitachi. In the peripheral and terminal sector, the company scored a 25% increase, bringing the total take there to \$150 million.

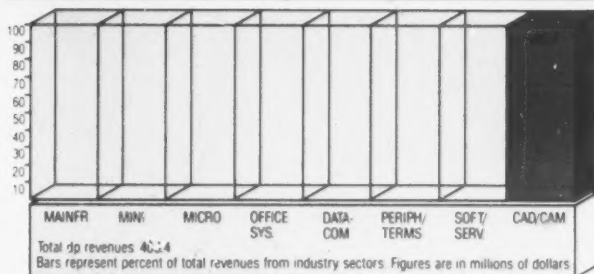
Some of that revenue was contributed by National Semi's point of sale (POS) operation. That operation was in turn helped out by the acquisition during the year of Data Terminal Systems Inc., the Maynard, Mass., maker of computerized cash registers and checkout systems. On the heels of the takeover last June, six executives resigned from DTS, which had reported a 34% drop in revenues to \$78 million in 1982.

Undisturbed by this decline, National felt the DTS products would help expand its line of supermarket checkout systems. The new subsidiary, which combines the two operations, is called National Semiconductor Datachecker/DTS Corp.

During 1983 the company's NAS unit expanded its top-of-the-line AS/9000 series to include five processors that compete with the IBM 3081 and 3084. On the peripheral's front, National announced several new products including the 7380 disk storage subsystem and two entry-level tape drives/controllers.

National also continued to spend heavily on R&D last year. During FY83, R&D expenditures climbed 13.6% to \$109 million. Much of that investment is directed at new products, and many of those new products are in the semiconductor sphere. While not included in this survey, semiconductors, which are the backbone of the dp industry, are the real basis of National's business. Last October, the Silicon Valley firm announced the 32032, the industry's first commercially available 32-bit chip, which sells for \$220 in quantities of 100 or more.

A month after this announcement, IBM amended its complaint that alleges NAS stole trade secrets from the company. IBM's claimed damages ranged between \$750 million and \$2.5 billion. Most industry watchers and Wall Street analysts don't believe the suit will amount to much. They're also predicting that the explosive demand for semis will rocket National Semi's earnings ever higher.



COMPUTERVISION CORP.

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Bedford, MA 01730
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For Computervision, 1983 was mediocre. Revenues in 1983 climbed 23% to \$400.4 million, keeping the company firmly entrenched as the market leader in CAD/CAM and computer aided engineering products. Income, which grew by a measly 2% in 1982, climbed 9% to \$35.4 million in 1983. The company's work force however, grew in parallel to revenues, with the payroll totaling 5,000 employees, a 21% hop over 1982.

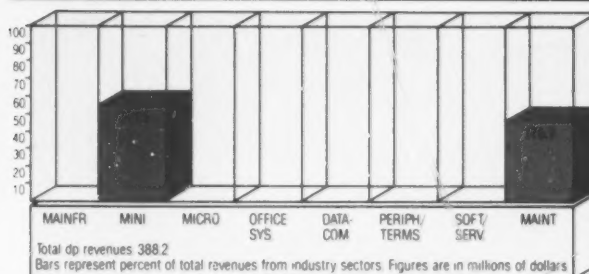
Clearly, all is not well at Computervision. For while it grew modestly and reversed its declining revenue growth trend, its competitors soared during 1983. Intergraph, the leading challenger to Computervision's dominance, grew 62% to \$255 million in 1983 from \$155.6 million in 1982. So while Computervision is still the market share leader, its position may be threatened in the next few years by Intergraph and by other competitors like Auto-Trol and GE's Calma.

Computervision's inability to keep pace with the exploding market is directly attributable to the company's past insistence on a vertically integrated approach. It has been the only company to build its own hardware rather than buy hardware from outside sources and write software for it. Intergraph, for instance, has been highly successful buying DEC minis as host processors. Analysts of the company for years have been stressing the importance of dropping the hardware component of their product and replacing it with purchased hardware, to no avail.

The rationale for keeping the hardware development in-house is that the company could then guarantee upgrade paths for its users. The drawback is that Computervision's hardware line is almost entirely 16 bit in an age where 32-bit cpus are increasingly common in CAD/CAM. The result is that some of Computervision's customers have been switching to other vendors. Backlog at the end of 1983 was \$91 million, only 16.7% greater than at the end of 1982, indicating that the first half of 1984 could mark a renewed decline in earnings growth.

Computervision took the first steps away from vertical integration in 1983 when it announced two separate oem agreements through which IBM and Sun Microsystems would begin providing hardware to the company. And the company boosted R&D spending 20%, to \$36.3 million, indicating that it is prepared to spend the money necessary to rewrite its applications software for the purchased 32-bit systems.

Company management recognizes that the firm is in for a rough 1984. The CDS-4000 and Designer V-X systems, introduced last year, incorporate the new CADD5 4X software, which should help the company's revenues substantially. That may be offset by continued erosion of foreign earnings because of the strength of the dollar overseas.



MANAGEMENT ASSISTANCE INC.

560 Lexington Ave.
New York, NY 10022
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Management Assistance Inc. had in 1983 what its management called "a year of transition." Hardware sales at the Basic Four subsidiary fell for the second year in a row while service/maintenance revenues rose at both Basic Four, internationally, and Sorbus, domestically.

Total revenues for MAI in calendar 1983 were \$388.2 million, up from the \$354.2 million registered the year before. Profits, however, fell to \$1 million from the previous year's \$6.3 million. Service revenues totaled \$169.2 million while minicomputer revenues were pegged at \$211.5 million.

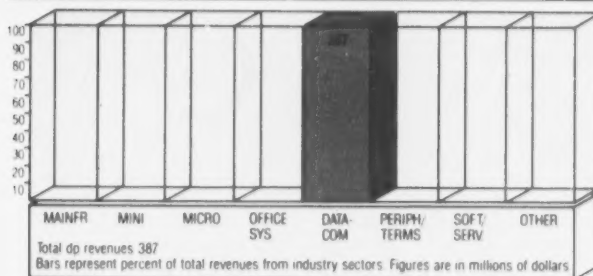
While continuing to build small business systems that run a proprietary operating system, Basic Four last year moved to strengthen its standing in the packaged software market. In addition to sharpening its focus on a number of vertical markets where it competes with specialized software companies, Basic Four repackaged its general accounting software for the IBM and Tandy personal computer markets. The company sees its new software business as a promising new revenue stream as well as a long-term opportunity for future upgrades of pc users to the Basic Four hardware line. The software will be sold through Radio Shack computer stores for use on that firm's TRS-80 model 2000 and through other retail outlets for IBM PCs.

Basic Four last year also introduced the first model in a new line of 32-bit virtual memory systems, the MAI 8000. It uses proprietary hardware configured in a multiprocessing, multi-user system and sells in the U.S. for \$30,000 and up.

Basic Four showed a loss of \$10.2 million for fiscal 1983, compared to a profit of \$6.99 million the previous fiscal year. In contrast, the firm's service operations—handled by Sorbus in the U.S. and Basic Four abroad—showed a profit of \$28 million for fiscal 1983. Approximately 40% of Sorbus' revenues come from servicing Basic Four equipment in the U.S., with the rest derived from maintenance contracts with other manufacturers and contracts with end-users for servicing a wide range of IBM equipment. Sorbus last year moved aggressively to expand its servicing of personal computers of all kinds, offering depot maintenance for small users and on-site services for large corporations that use a mix of different machines.

MAI entered 1984 with its management trying to fight off a dissident shareholder, arbitrator Asher Edelman. At the annual meeting, Edelman won four seats on the company's board. Both Edelman and MAI's management announced they had had talks with several companies that had expressed interest in acquiring MAI. Edelman, however, vows to fire MAI's chairman Raymond P. Kurshan, but comments that he doubts that he has enough votes right now. Keep tuned for the perils of MAI.

37



RACAL DATA COMMUNICATIONS INC.

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Miami, FL 33166
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Modems mean money to Racal-Milgo, the separately run American subsidiary of the \$1 billion British company Racal Electronics Plc. Last year was another good year for the merry modem maker, which registered a 29% revenue rise to \$387 million. This was an improvement from 1982, when it recorded a 25% revenue hike.

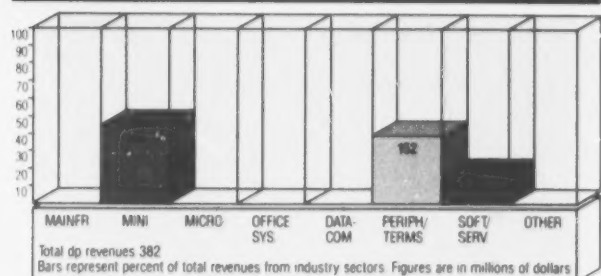
All these sales didn't generate happiness, apparently, because the British parent sent in a new manager during the year, Edward Bleckner was appointed president, and later promoted to chairman, and ceo. Apparently the problem was an accounting nightmare blamed on Racal-Milgo's fast growth. The problem was solved only after 40% of the work force was laid off. To boost its revenues and image, the parent has opened a New York office and hired a public relations firm. Another expected move is a big push into the CAD/CAM market, where Racal Electronics claims to have captured 44% of the business in Europe. Approximately 26% of Racal-Milgo's revenues are generated from foreign sales.

The company was formed in 1955 as Milgo Electronics Corp. and was bought by Racal in 1977. The Milgo operation handles higher-speed modems and the more sophisticated peripherals. Racal Electronics has also purchased Vadic, which produces low-speed modems.

One of its more sophisticated peripherals—the dial-up Datacryptor II—was unveiled last year. The \$2,300 device encrypts data on circuit-switched networks. It operates in half- or full-duplex modes, synchronous or asynchronous, at up to 9.6Kbps. In early 1984, Racal-Milgo introduced two cost-saving options for its Omnimax series of statistical multiplexors.

When Racal Electronics Plc. announced its midyear results, it became apparent that the parent was very happy with the changes in Miami. As Sir Ernest Harrison predicted, "The Data Communications Group will be the largest contributor to sales and profits by the end of the current fiscal year, due in large measure to the strong performance in the United States."

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MOHAWK DATA SCIENCES CORP.

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Parsippany, NJ 07054
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Mohawk Data Sciences muddled through 1983 much as it did in 1982. Once again, revenues increased modestly and earnings fell more significantly. In 1983, corporate revenues increased 10.7%, to \$400 million from \$361.3 million, while income dropped 29%, to \$9.6 million from \$13.5 million. In 1982, by comparison, revenues rose 12.6% and income fell 18.3%.

Dp accounted for over 95% of corporate revenues, down slightly from 1982, but that is due more to the strength in MDS's Dek Identification Systems division, which makes color photo identification cards for drivers' licenses. Dp revenues grew 9.5% in 1983, to \$382 million from \$348.9 million.

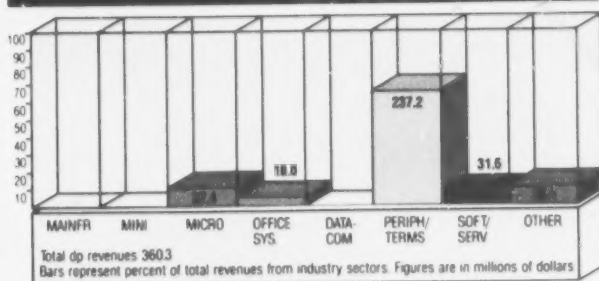
The MDS Systems division, which sells distributed processing systems into the IBM mainframe environment, was sluggish throughout the year. Profits were depressed also, in part because it conducts 35% of its business overseas and was hit with currency-translation losses. The division introduced the Personal Computing Attachment to its Series/21 line of processors. Essentially, it allows Series/21 terminals to access CPM software stored in the host processor; the terminals are still dumb, however. The division also premiered the Hero intelligent workstation, a version of Convergent Technologies' N-Gen 16-bit microcomputer custom modified to operate in the Series/21 environment; it was the first version of N-Gen to make it to market. Over the year, the Systems division recorded a 4.8% increase in peripherals and terminals revenues, to \$152 million, and a more substantial increase in processor revenues.

The MDS Qantel division, acquired in 1982, continued to perform well, registering a 12.8% growth rate. The division continued to specialize in selling minicomputer-based vertical market turnkey systems. A majority of the teams in the National Football League, a handful of professional baseball teams, several college football teams, and other sports franchises have installed the Sportspak version of the Qantel computer systems. Late in the year, Qantel introduced a hotel and motel management system similar in nature to the sports management system.

The MDS Trivex division, formerly an independent supplier of 3270-compatible terminals, essentially disappeared during 1983. The Systems division absorbed all of its U.S. business, including the name, while in Europe the division's name lives on, although its product line has been merged into the Systems division.

R&D expenses remained constant at \$23 million, less than 6% of 1983 revenues, despite the introduction of the Qantel vertical package and the two Systems products. Employment increased 2%, to 5,500 worldwide. Management expects that 1984 and the future years will see MDS rebounding, as the new products reach their peak earning potential.

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C. ITOH ELECTRONICS INC.

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Los Angeles, CA 90066
(213) 306-6700

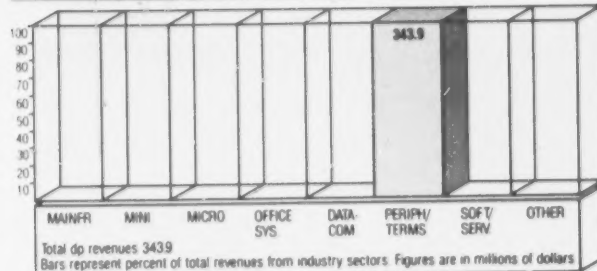
This U.S. subsidiary of the Japanese trading firm C. Itoh & Co. had revenues of \$440.3 million last year, \$360.3 million of which was derived from computer-related equipment. These figures compare favorably with last year's, which showed revenues of \$326.4 million overall and \$290.6 in the dp field. While building no hardware itself, C. Itoh Electronics imports micros and small peripherals into the U.S. market and exports U.S. goods to foreign markets, particularly Japan.

Last year saw C. Itoh Electronics record micro revenues of \$37.4 million, office systems sales of \$18 million, and peripherals sales of \$237.2 million. In addition, revenues of \$31.6 million in software and \$36.4 million in miscellaneous dp goods were recorded. Employment rose to 1,140 persons, up from 800 in 1982.

The company established a new subsidiary, CIE Terminals Inc., in Irvine, Calif., to sell terminals and printers to oems and distributors. Among several new products introduced last year were the CIE 7800, a line of 3270-compatible units, a color terminal, and products designed to display graphics. Approximately \$22 million worth of terminals were sold last year.

C. Itoh Electronics' export activities include shipping goods to Japan and Europe from more than 50 U.S. manufacturers. In the U.S., it represents more than 10 Japanese makers of peripherals and systems including General Corp. and Tokyo Electric. The company is also involved in venture capital financing of technology oriented companies.

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TANDON CORP.

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Chatsworth, CA 91311
(213) 993-6644

Sirjang Lal (Jugi) Tandon's company could be rated an overnight success. Started on a shoestring investment of \$7,000 in 1975, the company was well on its way to becoming the industry's dominant 5¼-inch disk drive supplier by 1979. Today Tandon is 50 times the size in both sales and assets that it was back in 1979, when the first disk drive rolled off the production line. Those drives are continuing to roll off and the profits are also continuing to roll in. Last year Tandon's dp revenue skyrocketed 94% to \$343.8 million, making it one of the top growth gainers in the DATAMATION 100. Profits blossomed also, up to \$27.2 million, a 43% increase over 1982's \$19 million.

That profit picture would have been even brighter if Tandon had not made a \$12 million provision for bad debts because of its riskier microcomputer customers, like Victor Technologies. Despite this \$12 million receivable, Tandon is continuing to ship, on a cash basis, to the financially troubled micro maker. There is no such risky business on the part of IBM, a large and loyal Tandon customer. In fact, Big Blue was responsible for approximately 21% of drive sales in fiscal '83.

Tandon's business is drives—floppies, Winchester, and tape cartridge varieties. The company's 1983 share of the U.S. and European market for 5¼-inch oem floppies was estimated at 50%. In July, Tandon bolstered that position by capturing a \$310 million contract from a mystery micro maker.

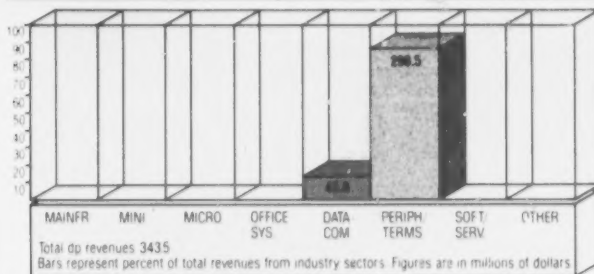
Tandon's success formula, however, is no mystery. Low pricing strategies have clearly put the company in the driver's seat in the drive market. It has managed to consistently achieve those low prices by cutting costs through vertical integration and use of efficient automated production techniques.

To keep those all-important low-unit costs, Tandon poured \$21.2 million into new facilities and equipment last year. Some of those big bucks went into expanding production capacity at the company's five disk drive and subsystem plants in Southern California and Singapore. Engineering and R&D expenditures more than doubled in FY 83 to \$13.7 million. Gross profit was 27.5% of sales—down from 36% because of costs associated with new product introductions and related expenses.

Tandon hedged its bets by focusing on the high as well as the low end of the microcomputer market. The company came out with a 5¼-inch Winchester subsystem that expands IBM PC memory capacity either 10MB or 15MB for under \$2,000. For the transportable pcs, Tandon unveiled the Thinline family of 5¼-inch Winchesters that are 1.6 inches high and micro-floppy drives that use 3½-inch diskettes.

In 1984 Tandon seems set to repeat the success formula that's made it the envy of micro drive suppliers everywhere. With drive like that, the company will be hard to stop.

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DATAPRODUCTS CORP.

6200 Canoga Ave.
Woodland Hills, CA 91365
(213) 887-8451

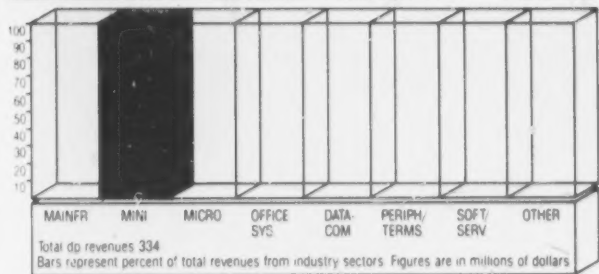
Dataproducts came bounding out of the recession with its best year ever in 1983. The company recorded \$343.5 million in revenues, a 10% increase over 1982. Net income rebounded with an 83% gain to \$19.1 million after a 50% decline in 1982. The company's backlog at year-end was a record \$185 million, \$50 million more than a year earlier, owing to the booking of \$110 million of orders in the fourth quarter. During 1983, Dataproducts installed productivity programs to improve its profits picture. These programs have put the company in a good position for continued profits in 1984.

Dataproducts is still the leading independent printer supplier, and in recent years it has moved forcefully to diversify its printer offerings. As late as 1978, it offered line printers and nothing else. Since then, the company has expanded its low-end offerings to include several matrix printers, a daisywheel family, band printers, and thermal printers. In mid-1982 Dataproducts acquired Integral Data Systems, a New Hampshire printer manufacturer concentrating on these low-end systems, and by last year the merger was operating smoothly. Much of the increase in Dataproducts' business, in fact, can be directly attributed to the success of these low-end printers, says company president and ceo Charles Dickinson.

Dataproducts sells its high-end line printers primarily through computer system manufacturers acting as oems, while others are sold more frequently to smaller accounts, such as sophisticated end users who package their own systems. Both ends of the line performed well in 1983, with the line and band printers retaining their market dominance, matrix printer volume increasing, and daisywheel printer shipments beginning to reach volume quantities.

During 1983, like many other dp companies, Dataproducts announced the formation of joint ventures. In July, it entered into an agreement with 3M for the development of printers using nonimpact technology. The first printer, for which Dataproducts will develop the application software and interface, is expected to be shipped by mid-1984. Dataproducts also teamed up with Quality Micro Systems Inc. in a joint marketing agreement under which Quality will supply intelligent graphic controllers for use with a Dataproducts dot matrix printer.

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GOULD INC.

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Rolling Meadows, IL 60008
(312) 640-4000

The recession stifled Gould's computer business last year, but as the economic turnaround progressed, orders rebounded for the company's lines of high performance 32-bit superminicomputers and hardened dp gear. Total corporate revenues inched ahead 5.7% to \$1.3 billion in 1983 and dp revenues similarly slogged ahead modestly, to \$334 million, up 2.7%. Net income dropped 30% to \$64.1 million, mainly because of losses from discontinued operations like its recently sold battery division.

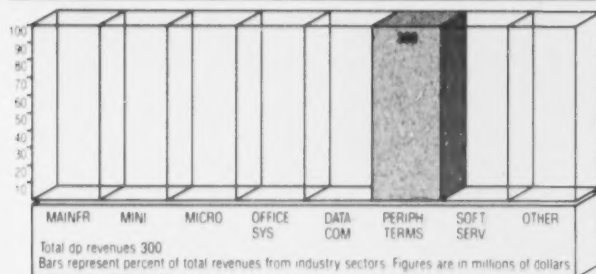
Gould is known as a provider of heavy duty computing power for scientific and government applications. Since it acquired Systems Engineering Laboratories in 1980, new product development has increased and otherwise strengthened the Ft. Lauderdale vendor. Last year the 32-bit line was broadened for commercial markets. New software and terminal products, like Unix, Ethernet, and a line of workstations from Convergent Technologies, look good on paper but haven't helped the company break out of its narrow niche.

Competition among suppliers of 32-bit minis and factory automation equipment known as programmable controllers was fierce last year owing to the dearth of orders from industrial customers. Gould notes that prices plummeted as competitors tried to expand market share. The factory automation market is crowded with powerhouses like Texas Instruments, Westinghouse, General Electric, and a host of smaller players, while the 32-bit field is especially tough with Data General, Prime, Digital Equipment, and other broad suppliers focusing on some of the engineering niches once the exclusive province of SEL and Perkin-Elmer.

R&D spending seems to be part of the prescription for keeping ahead of the competition. At 8.4% of revenues or \$111.4 million, Gould's spending is growing faster than revenues.

Now that Gould's chairman William Ylvisaker has kicked out the last of the company's old electrical products, his electronics company has to prove to the outside world that the turmoil in Rolling Meadows during the past four years was worth it. Profit margins and return on equity are not exactly robust, and 1984 will be the first year that the company can be judged strictly on the merits of what it has become, rather than on the hopes and dreams of its chairman.

43



TEKTRONIX INC.

4900 S.W. Griffith Drive
Beaverton, OR 97077
(503) 627-7111

The opening statement in Tektronix's annual report says it all: "The dill-pickle look on your face says you have just read our highlights, as they are euphemistically called. They once again reflect a tough year. Our earnings took a pasting."

And what a pasting it was. Net income for the year ending Nov. 30 plummeted 39% to \$49 million; total revenues at \$1.2 billion were relatively flat, as were data processing revenues. All of this left Tek's high-tech spirits pretty low.

DATAMATION estimates that Tektronix's dp revenues for 1983 remained at the 1982 level of \$300 million. Included in this dp category are graphics terminals and displays, computers, and hardcopy output devices such as copiers. A world leader in cathode ray oscilloscopes, Tek used to be at the forefront of the graphics terminal trade, but intense competition from new start-up companies dimmed the glow for the Oregon company. Bidding for a comeback, the energetic company has launched an ambitious campaign to recover the lost graphic ground. The enthusiasm is there—at least among Tek employees at the Wilsonville, Ore., plant, who proudly displayed bumper stickers last year declaring, "The Graphics Empire Strikes Back."

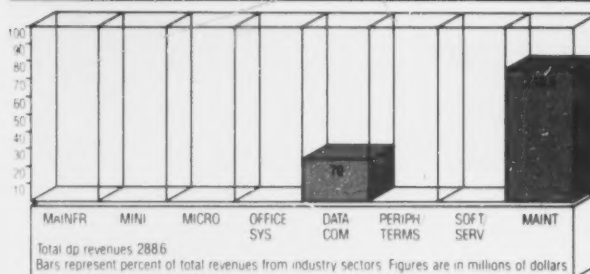
It will take more than employee enthusiasm, however, to bring the company back to the position of preeminence it had in the '70s in the graphics terminal realm. Tektronix does nevertheless have a fighting chance. And fighting it is with such products as the high-end 411B and low-end 4107 Unicorn series graphics terminals—both of which were being shipped on schedule last year. Tek is hoping the Unicorn in particular will score big sales, helping it in its comeback campaign.

Realizing that users needed software for specific graphics problems, Tektronix, which has been weak in software development, brought VR Information Systems on to the TEK team last year. The small Austin, Texas, software house specializes in computer aided design applications for electrical engineering. Also on the software side last year, Tek came out with Lands, a software development tool that runs under Pascal.

Some of Tek's problems come from its decision to decentralize its operations. Starting in 1981, the company began dividing up its divisions into business units. Tek believes this divide and conquer approach, which initially creates job duplication, will streamline the company's internal operations, making it more responsive to market and customer needs.

Tektronix is also hoping this strategy will help it avoid the large layoffs it was forced to make in 1982 and 1983. Those were admittedly painful decisions, but necessary if the company was to make it against tough competition. The company is counting on conditions getting better—as one Tek vp described it, "cycling through the whoopsies."

44



TYMSHARE INC.

20705 Valley Green Drive
Cupertino, CA 95014
(408) 446-6000

Times have been tough for Tymshare, a pioneer computer services company. So tough in fact, that the company accepted a proposed merger with McDonnell Douglas, which Tymshare had jilted just a few months before. Tymshare's dp revenues edged up 6% to \$288.6 million in 1983. The company pulled in the largest chunk of its revenues in the software and services category—\$218.6 million, up 3% from 1982. The biggest gains, however, were recorded by the company in the data communications sector, which in Tymshare terms means its successful Tymnet data communications network. In the datacom category, Tymshare's revenues were up a healthy 14% to \$70 million.

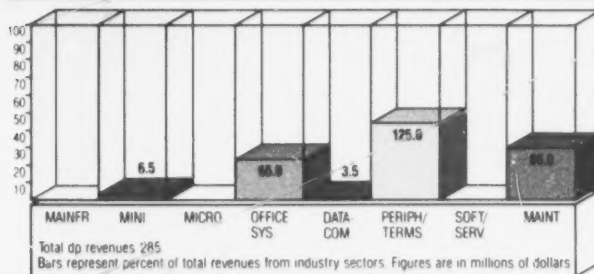
Approximately 40% of the company's operations are devoted to Tymnet, which now spans 450 cities in the U.S. and Europe. Tymshare added numerous cities to the sprawling network last year and plans to add more in 1984. Also on the datacom front last year, Tymshare inked an agreement to acquire international record carrier FTC Communications Inc. It also came out with Micro Engine Inc., a desktop version of its internally designed communications processor.

There is no doubt that the datacom side of Tymshare's business is where the action is. It's also where the action is in the dp industry. Activity in Tymshare's other major business—computer services—has slowed considerably. Market erosion in this sector has been due to falling hardware prices and the arrival of the microcomputer.

This sluggishness in the computer services industry has hurt the 18-year-old company. Realizing the damage, Tymshare had launched various campaigns in an effort to carve out new dp niches. It's also tried to minimize its losses by concentrating on a winner—its Tymnet operation.

This winner was unable to brighten the dismal profit picture. During 1983, Tymshare's net income plummeted a drastic 119%, putting the company in the red by \$1.7 million. Burdened by this debt, Tymshare became an obvious takeover candidate. In September, office automation specialists Wang Laboratories Inc. made an unsuccessful stab at Tymshare, acquiring a 4.3% stake. Shortly thereafter, Tymshare began preliminary discussions with McDonnell Douglas. Unable to whittle down the going price of \$420 million, the aerospace giant got cold feet and backed out. In early 1984, however, Tymshare lowered the price and is now part of the aerospace industry.

45



RAYTHEON DATA SYSTEMS

1450 Providence Highway
Norwood, MA 02062
(617) 762-6700

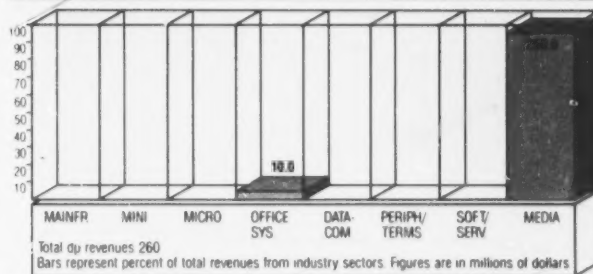
When the 1983 figures were released, the good news-bad news jokes could have saturated the office networks at Raytheon: sales were up, profits were down. Revenues rose 7.7% to \$5.94 billion, but, under pressure from what the company called increased R&D, administrative, and sales costs, profits were off 5.9% at \$300.1 million. One of the areas reporting increases in all these costs was commercial data processing.

But that expensive R&D is likely to make Raytheon Data Systems' future much sunnier. The end of '83 and the beginning of '84 saw the announcement of several encouraging new products. Already a veteran supplier of 3270-type, IBM-compatible equipment, Raytheon Data Systems announced in September the PT-1000/4000 family of 3270-compatible displays, printers, and control units. The company plans to make the ergonomic design features of this line a major selling point.

Raytheon is also going after the office automation market with intelligent terminals and microcomputers. Early this year the RDS Signature 8200 workstation made its debut, built around a central processing unit developed by Convergent Technologies using the Intel 80186 microprocessor. The 16-bit machine is IBM compatible, and Raytheon describes it as a "multifunction office system," usable as a standalone micro, a word processor, or a module in a data processing network. The machines will run three operating systems: the RDSOS "host," CPM-86, and MS/DOS. (The company also announced a sister machine, the 8400, that adds Unix V to the menu of operating systems.) Raytheon obviously hopes the product will broaden its customer base, heretofore concentrated in the defense and airline sectors.

Raytheon can give wide support to its entry into the OA race, with huge corporate resources and 130 facilities and offices located in 35 countries. Building on the experience it has gained in the word processing market since it bought the Lextron Corp. in 1978, Raytheon must be considered a serious contender in the OA competition.

46



3M

3M Center
St. Paul, MN 55144
(612) 733-9572

3M has come a long way since the 1940s, when it introduced the first commercial magnetic recording tape in the U.S. Today, the Minneapolis media pioneer can claim a product portfolio bulging with over 40,000 items. Most of these, however, are not data processing wares. In fact, the \$7 billion company derives only 3.7% of its total revenue from dp.

DATAMATION estimates 3M pulled in approximately \$260 million in dp revenues last year—up 16% from 1982. Most of the sales were in the area of magnetic storage media, which hauled in \$250 million. This represented an 11% increase over the previous year. The remaining \$10 million in revenue came from the office systems side, which includes such things as facsimile and communications terminals, computer output microfilm (COM) equipment, and computer assisted micrographic retrieval systems.

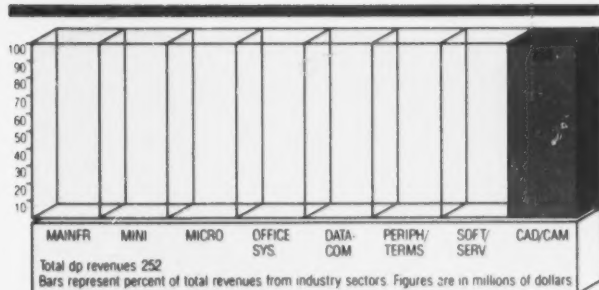
During 1983, 3M continued to focus on the office. To clarify that focus, the company last year merged its Office Equipment and File Management Divisions to form a new Office Systems Division. 3M launched an overall reorganization effort between 1981 and 1982. The revamp, which helped coordinate marketing and planning among the company's sundry divisions and groups, resulted in the creation of four main sectors. The data processing activities were slotted under the Electronic & Information Technologies Sector.

Some of the advanced R&D work at the company is channeled into this sector. Last year, 3M spent \$384 million on R&D, compared to \$349 million the year before. The company is currently working to develop thin-film magnetic media to meet future computer storage needs. The company is also experimenting with optical technologies that promise high-capacity, direct read-after-write capabilities needed by the next generation of systems.

All this optical research work does not mean 3M has given up on magnetic storage media. A leading mag media producer, 3M continues to concentrate on tape systems and flexible disks, which it expects will achieve a 40% annual growth rate in sales.

3M is also strong in the field of electronic document transmission. The company bolstered that strength this year by coming out with the Whisper Exchange. This system consists of a network of teleprinters that send and receive messages under computer control over telephone lines. Such developments, coupled with the new marketing momentum, should help 3M gain strength through 1984, when the company is expected to post an overall revenue increase of around 13%.

47



INTERGRAPH CORP.

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Huntsville, AL 35807
(205) 772-2000

There seems to be no end in sight to Intergraph's phenomenal growth over the last five years. Since 1979, revenues have grown 750% and earnings over 1,000%. In 1983 alone, revenues leaped 62% to \$252 million from \$155.6 million and earnings bounded 125% to \$29.3 million from \$13 million. Employment rose almost 40%, to 2,500—a far cry from the 765 employees on the payroll only three years earlier.

Intergraph's growth is ever greater than the booming CAD/CAM industry in which it participates. For example, the leader in the industry, Computervision, was only able to post a 23% revenue gain and a 9% income gain in 1983. Intergraph has clearly surpassed GE's Calma, Auto-Trol, and others as the primary challenger to Computervision's dominance in the industry, though it is now only 63% the size of Computervision.

There are several reasons for Intergraph's continued surge. The company has committed itself to developing CAD/CAM/CAE software, using purchased DEC hardware to complete its turnkey systems. The R&D budget was increased 43%, to \$28.2 million in 1983, and much of that went to the continuing conversion of Intergraph's applications code to run on the 32-bit VAX superminis. (Computervision, by contrast, is still developing its own hardware and selling 16-bit software.)

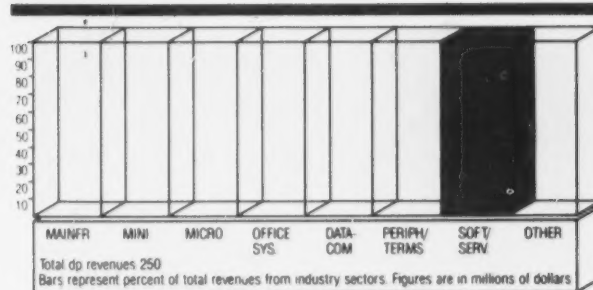
Intergraph has also focused its software on eight specific markets rather than selling its product line to all takers. These areas are mechanical design and manufacturing, electronics design, plant design, architectural and engineering design, cartography, geographic information processing, energy exploration, and utility facility management.

The software is written primarily for VMS-based VAX hardware, and can interact with other VMS applications from third parties. The Interactive Graphics Design Software (IGDS) provides a set of programmed design and drafting tools. It features a database with 4Gb resolution per dimension in a three-dimensional design space, allowing massive designs and maps to be constructed. IGDS comes with a library of design symbols, which can be expanded by users, as well as editing facilities and automatic dimensioning.

Intergraph's other primary software product, DRMS, is a data management and retrieval tool for nongraphic information. It allows users to organize statistical data, part numbers, pricing information, material characteristics, and text in support of graphic designs.

These products—and customized versions of them—are sold by Intergraph through a direct sales force in the U.S. and through wholly owned subsidiaries in Brazil, Korea, Japan, and Europe. The company had 800 installed systems worldwide at the end of 1982, the last year that statistics were available.

48



THE BOEING CO.

P.O. Box 3707
Seattle, WA 98124
(206) 655-1131

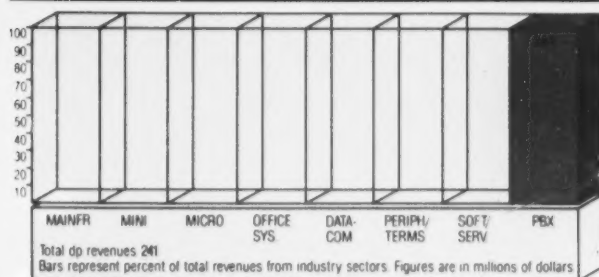
It's no secret that the remote computer services business is suffering since the advent of micros. Therefore, Boeing Computer Services president Robert L. Dryden had an attentive audience when he addressed the October ADAPSO meeting. Dryden got their attention when he said that "remote computing services companies will not be around in the future unless they meet the challenge of change."

BCS has the distinct advantage of being able to act on Dryden's wisdom because it has a captive audience on which to try new ideas. Boeing produced 60% of the free world's aircraft in 1983, chalking up revenues of \$11.13 billion. Net income was equally impressive at \$355 million, up 21.5% from 1982's \$292 million. BCS had 1983 revenues of about \$600 million, of which more than half was from the parent company. Outside revenue was reported at \$250 million, up 46% from the previous period.

BCS made many moves during 1983 to combat lagging demand. It expanded its international operations to include Japan and Saudi Arabia, and formed a major systems support group to pursue federal government business. Some of these moves paid off last year as Boeing attracted new clients like the IRS and the Department of Transportation.

Dryden says that by adapting to Boeing's needs, BCS was able to determine what other corporations needed. Therefore, BCS was working on an SNA and X.25 service to include in-house network development and management. In response to the shortage of in-house solutions and technical personnel, BCS is selling training and other services combined with its information processing.

49



MITEL CORP.

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Kanata, Ontario
K2K 1X3 Canada
(613) 592-2122

This Canadian datacom supplier grew substantially in 1983, but earnings were dismal. DATAMATION estimates Mitel's revenues for calendar 1983 at \$241 million (U.S.). Mitel's earnings, however, plummeted for the nine months ending Nov. 31—the company reported a loss of \$7.2 million (Canadian) vs. a profit of \$10.6 million the year earlier. Mitel points out that R&D expenses have grown to \$42 million (also Canadian), from the \$21 million reported earlier, mainly due to the development of its SX2000 integrated Communications System, which has been stalled in development. One bright note was the fact that initial testing by the British Telecom has been completed and the SX-2000 has been granted approval.

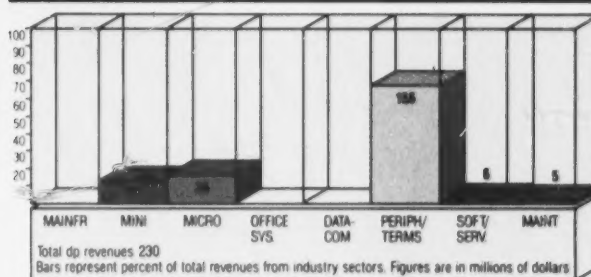
During 1983, Mitel introduced two other new products—Generic 100, which enables the installed base of SX-200 users to integrate voice and data while doubling the capacity of the system, and ACD plus, based upon existing SX-100 and SX-200 hardware. The ACD manages incoming calls for up to 30 telephone agents.

Mitel joined with two U.S. companies in 1983 for a variety of products. A deal with Johnson Controls, of Milwaukee, will provide an interface between Johnson's computerized building automation system and Mitel's "superswitch." This will allow users to manage heating, lighting, air conditioning, and security in conjunction with the data communication system. The partners expect to have a system on the market by mid-1984.

Mitel's other U.S. connection is with Skyswitch Satellite Communications of Denver, which hopes to manufacture and market satellite communications technology previously developed by Mitel.

While moving on many interesting fronts in 1983, it is clear that Mitel had best get its main business and its SX2000 on the road—before a competitor beats it to the punch.

50



NEC INFORMATION SYSTEMS INC.

1414 Massachusetts Ave.
Foxborough, MA 01719
(617) 264-8000

Japan's number three computer maker, NEC Corp., has yet to make a major dent in the U.S. market. Its seven-year-old State-side subsidiary, NEC Information Systems, has suffered from sluggish sales on the dp equipment front. NEC is nevertheless racking up respectable revenues in America. Last year, dp revenues shot up 44% to \$230 million. Most of that revenue came from oem peripherals, such as its popular line of printers, sales of which rose 64% to \$156 million. Minicomputer revenues were up over 50% to \$27 million, while microcomputer revenues dropped 14.3% to \$36 million.

NEC currently has approximately 2% of the U.S. pc market—a poor showing for a company that has managed to capture 45% of its home market. Part of the problem stems from the fact that its 8-bit PC-8000 doesn't run under CPM. Sales of its newer 16-bit APC (Advanced Personal Computer), which was announced in 1981, are picking up, however.

In addition to the pcs, NEC Information Systems also sells the Astra small business computer in the States. So far the system has not had great success. Maybe the company will have more luck at the high end of the market. That's a hope shared by Honeywell.

Last year the two vendors began negotiating a pact that would give Honeywell exclusive marketing rights to NEC's top-of-the-line Acos 1000 mainframe in North America, Australia, and parts of Europe. Under the deal, the two companies will jointly develop large mainframes and exchange licenses on various equipment patents.

Actually, NEC started in the computer business by licensing Honeywell systems over two decades ago. The new alliance, seen as a counteroffensive against IBM, got both companies out of the sticky situation that found them competing against each other on an important GE Information Systems (GEISCO) contract bid.

NEC's so-called C&C strategy, which combines computers and communications, has worked very well for the company in Japan. It could also work well in America. Earlier this year the company's U.S. communications subsidiary, NEC America Inc. in Melville, N.Y., captured contracts to supply PBXs to several newly unbundled Bell operating companies—U.S. West, Ameritech, and Bell Atlanta. NEC is clearly after a bigger slice of the U.S. PBX pie. This could also be a plus for NEC Information Systems, since NEC PBX customers could well be interested in other NEC wares—namely, small business systems and pcs. If this twofold strategy works, NEC could gain a valuable foothold in the American dp market—a market that has so far eluded the \$7 billion Japanese conglomerate.

51

PERKIN-ELMER CORP.

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Norwalk, CT 06856
(203) 762-1000

For Perkin-Elmer, 1983 was a year in which everything changed except the numbers. Corporate revenues were up a mere 5.5%, to \$1.07 billion, while net income inched forward 1%, to \$51.8 million. The Data Systems Group, the firm's only division selling dp equipment, did somewhat better, with a 9.6% increase in revenues, to \$225 million. Its pretax profits held steady in the 8% range. Other indicators were also flat: employment increased 1% to 14,372, and R&D stalled at \$80.3 million, about 7% of revenues.

Beyond the financial results, however, the Data Systems Group was very much an organization in transition during the year. It began the year as a broad-based minicomputer supplier, selling a range of 32-bit machines to all comers. Most of its sales, however, were to technical and scientific installations. Through the year, the company realized it could not compete with powerhouses such as DEC, IBM, and Data General, and it moved toward a niche approach similar to Gould S.E.L.'s past philosophy. Perkin-Elmer began to concentrate on its scientific and analytic users, and on users who were already familiar with the P-E name from the firm's instrument, semiconductor equipment, and optical products groups. The Data Systems Group also expanded its line of software offerings, hoping to become more of a turnkey vendor to its selected niche.

The company made several new product announcements during the year. It topped off its 32-bit line with the 3200MPS, a multi-processing system that can be expanded as users' needs increase by plugging in up to eight additional auxiliary processors. Perkin-Elmer also rounded out the low end of the 3200 line with the 3205, a low-priced model designed to appeal to new customers. Later in the year, the 7500 Professional Computer, a 16-bit micro, was introduced. It is the same machine as the desktop micro previously announced by another P-E division for the analytical chemistry market.

Among the most significant of Perkin-Elmer's transitions was a move toward a more open architecture designed to operate in multivendor environments. The PENnet local area network was introduced as the focal point of P-E's new Everyware strategy, which essentially makes P-E equipment capable of running in a wider range of installations. By giving its equipment that capability, Perkin-Elmer hoped to increase its attractiveness in scientific niches within IBM or other foreign shops.

The company was also active on the software side, introducing a major new version of its Edition VII of the Unix operating system, several communications protocols, and a range of application software packages.

52

SCI SYSTEMS INC.

5000 Technology Dr.
Huntsville, AL 35805
(205) 882-4800

SCI's 1983 revenues and income soared as high as did some of its magnetic core memories for computers used in the MX missile. This rapid growth can be directly attributed to IBM, which awarded SCI Systems a contract to assemble the circuit boards for the IBM Personal Computer. In calendar 1983, total dp revenues were up more than 200% to \$225 million from \$80 million in 1982. Corporate revenues were \$300 million, up from \$133 million in 1982. Net income for the year increased 60% to \$6.6 million, as compared with \$4.1 million in the preceding year.

Customer orders with a total value of \$386 million were received during FY '83 to bring the company's year-end order backlog to \$522 million. This represents a 64% increase from the \$318 million backlog at the end of the previous fiscal year. They must say "bless the PC" every night.

In addition to the PC, SCI has a family of small business computers that support multiple users in a multitasking environment and also offer a variety of office automation, data processing, and software development capability. The company's rotary printer is sold as a printing mechanism or a complete printer and is part of a number of commercial and military terminals developed by SCI.

During the year, SCI occupied and brought on stream a new manufacturing plant in Alabama, apparently for the PC, and hired more than 1,000 people, bringing the work force to 4,006, up from 2,920 in 1982.

SCI is broadening its traditional customer base from military and aerospace contracts, and has established itself as a low-cost producer of commercial products in large volumes. SCI's success in custom manufacturing the PC will play an important role in the company's plans as long as Big Blue doesn't go elsewhere.

53

TELEX CORP.

6422 E. 41st St.
Tulsa, OK 74135
(918) 627-1111

Telex continues to practice the art of beating IBM to the punch in the 3270 terminal and controller markets. While that's not always a good idea—as its fiasco with tape drives a decade ago made clear—it has enabled the company to maintain its position as the second largest 3270-compatible supplier. The firm recorded solid growth for the second year in a row, with revenues climbing 20% to \$306 million and net income hitting \$33.8 million. Revenues from dp climbed 14% to \$221.7 million in 1983.

Telex is divided into two subsidiaries, Telex Computer Products (TCP) and Telex Communications Inc. (TCI). TCP's portion of the company's business continues to rise, hitting 77% of corporate revenues and 84.5% of corporate pretax profits last year. In 1983, TCP benefited from the first significant sales of a pair of products launched in 1982, the TCP-178 display terminal and the PROFFIT desktop workstation.

The TCP-178 is a scaled-down version of the TCP-278 terminal, which is a substitute for the IBM 3278. The 178 was announced nine months before IBM came out with its own 3178 terminal, giving Telex a substantial lead in getting the smaller terminals installed.

The PROFFIT (Professional Office Terminal) was one of the first combination terminal/microcomputer products offered. The product is an attachment to the 278 terminal that gives it CP/M compatibility. While the 8-bit architecture and the need to use two separate housings is behind what is currently considered state of the art, such as the IBM 3270 PC, the product's immediate availability has been attractive to users impatient with IBM's lead times.

54

SEAGATE TECHNOLOGY

920 Disc Drive
Scotts Valley, CA 95066
(408) 438-6550

Seagate jumped into the DATAMATION 100 with a threefold increase in revenues to \$221 million, up from the \$57 million of 1982. Earnings moved at a faster pace, up 400% to \$29.6 million.

It's a case of being in the right place at the right time and, happily, with the right product. Formed in November 1979, Seagate entered the disk drive market as a producer of the 5¼-inch Winchester disk drives. The demand for these products has been nothing short of spectacular, and Seagate has been able to capture large customers, including IBM.

During 1983, Seagate took a number of steps to insure its continued success. For starters the company raised \$72 million in a new stock offering. Putting this cash to use was easy. Seagate expanded its production facility in Scotts Valley fivefold. Then it planned construction of a new factory in Watsonville, Calif. In addition, the company opened a new R&D center and a Singapore arm to produce subassemblies.

Perhaps the most important move of the year was establishing a zero defects production line, apparently as a result of vendor concern that the entire disk drive industry was not performing up to par. The company overhauled its operations and opened the Seagate Quality Institute to improve employee training and motivation.

Management was broadened with the appointment of a number of new executives, including Tom Mitchell as president and ceo.

This was done to give founder Alan Shugart more time to focus on the future. Considering how well Shugart has done so far, there probably isn't a more qualified candidate anywhere.

55 SHARED MEDICAL SYSTEMS CORP.

51 Valley Stream Pkwy.
Malvern, PA 19355
(215) 296-6300

SMS continued its history of major growth in revenues and earnings, and displayed a financial performance that compares favorably with the best in the business. Revenues of \$210 million were up 27% last year from 1982 and net income also soared to \$27.3 million. Its return on assets and net profit margin are traditionally in the double digits, and expectations are that the growth and financial performance will continue for the next several years for this supplier of dp services for hospitals.

The big question mark on the horizon is the effect of new federal regulations on medical spending. Medicare reimbursement rates for hospitals will be under a new program with set rates, and hospitals will have to have a better handle on their costs and patient mix. So on the one hand SMS's customers are being forced to cut costs, such as dp spending, while on the other hand the only way hospitals will be able to control the money is with more dp. Taking advantage of the situation, SMA introduced a number of new software packages to help its current and new clients manage their finances.

In addition to its timesharing of data processing for medium-sized hospitals, the company has become a value-added reseller of IBM PCs and other desktop units, adding its financial and resource management software to offer a less expensive networked system for smaller hospitals.

56 GENERAL INSTRUMENT CORP.

1775 Broadway
New York, NY 10019
(212) 974-8700

General Instrument bottomed out last year, smarting from the beating it took when video games turned into horror shows and small home computers stopped going home with consumers. Sales of the components it made for these industries plunged. And the scaled-back plans of CATV suppliers hurt General Instruments' sales of its newest generation of addressable cable tv converters. Also, volume shipments of new memory and telephone dialer chips fell behind schedule. Startup costs on new products were higher than management had expected. In a year of

widespread economic recovery, General Instrument's corporate revenues dropped from \$1 billion to \$891.7 million, a fall of over 10%. The bright spot, however, was dp revenues, up almost 23% from 1982's \$163 million to \$210 million last year.

The company sees a return to the company's past growth pattern in the coming year, but some problems remain despite cost cutting and the introduction of new products. The new components—for the automobile, personal computer, and telephone industries—upon which it is banking for renewed growth won't produce the fat margins that video game and home computer chips engendered. Problems with volume production were also rumored at one of GI's two new semiconductor plants.

Good news for the company included an extension of its contract with Connecticut's Off Track Betting, a deal valued at more than \$60 million. (GI also has high hopes for its Teletrack data system if, as is expected, California okays off-track betting this year.) GI also continued its winning ways in the state lottery business, installing a multistate central processing center in Augusta, Maine, from which it handles the lotteries of Maine, New Hampshire, and Vermont.

Aquisitions of Charter Data Products and, in late '82, Energy Management Corp., and the increase of its investment in Sytek Inc. also revealed the company's beefed-up dp plans for local area networks, the expansion of its bank-remittance processing, point-of-sales systems, and microprocessor-based energy control.

In 1983, GI continued to be the world's number one producer of ROMs, and also leads in EPROMs. Its microelectronics group is investing heavily in speech synthesis and recognition: when better news is reported about this company's turbulent bottom line, one of its own products may well speak the lines.

57 PARADYNE CORP.

8550 Ulmerton Rd.
Largo, FL 33540
(813) 530-2000

The embattled Paradyne Corp.'s 1983 net income plunged 23.2 million to \$3.6 million, as compared to 1982 net income of \$26.8 million, in the wake of its legal problems with the Securities and Exchange Commission. Revenues barely broke even, inching up a little more than a million dollars to \$208.9 million.

"Paradyne experienced a difficult year," says Robert S. Wiggins, chairman, president, and ceo of the company, in summing up Paradyne's woes.

Paradyne cited "substantial" legal costs in defending itself against the SEC allegations filed in federal court that the company was putting its own labels on another company's computers in its efforts to obtain a

\$100 million contract from the Social Security Administration for 1,850 microcomputers. Paradyne got the contract, but though the company denies any improprieties, it also got a peck of trouble.

Management said it spent more than \$2.5 million on outside legal counsel during the year. According to the company, these fees represent payments incurred defending itself in the SEC action, as well as against subsequently filed private actions and "collateral matters."

A bright spot in the midst of Paradyne's legal problems appeared when it reported its one-year backlog of unfilled orders, due for shipment in 1984, had a purchase value of \$147 million, up from the \$134 million backlog reported a year ago. The company also upped its sales force to 245 persons in the United States during 1983, and made several organizational changes in its upper management.

58 EXXON CORP.

1251 Avenue of the Americas
New York, NY 10020
(212) 398-3093

Life was somewhat crude at the world's largest oil company last year. Things were more refined at its Exxon Office Systems (EOS) subsidiary, though.

Exxon Corp.'s revenues fell 9.4% to \$94.59 billion. Remarkably, net income posted an impressive 19% gain, reaching \$4.19 billion. Contributing to that performance were EOS and Exxon Corp.'s other electronics businesses, known as "other operations" within the corporate conglomerate. These have rebounded nicely from a \$48 million loss in 1981.

DATAMATION estimates that EOS's sales were \$200 million last year, a 17.5% increase over 1982. While Exxon refuses to provide figures, it is quite likely that EOS is still losing money.

EOS hopes to become a winner through a number of new products. The 3270 Emulation software enables any Exxon 500 Series workstation to emulate a 3270 terminal, using a third-party protocol converter that can support either bisync protocols or Systems Network Architecture (SNA) protocols. WP-CPM Integration software allows users to transfer files bidirectionally from word processing mode to CPM mode. The Legal Administrator Applications Program should make life easier for attorneys. The 210 Intelligent Typewriter led off a 200 Series family in which the high-end 220 will eventually offer a 32-character display and 12Kb to 36Kb of memory.

Exxon was busy on the legal front as well. Its Zilog subsidiary, maker of the successful Z-80 chip, the System 8000 supermicros, and winner of major contracts from Commodore and the Internal Revenue Service during 1983, filed a complaint with the

International Trade Commission alleging patent infringement and unfair import practices by Nippon Electric Co. (NEC). Separate suits in Philadelphia and South Carolina charged employees of Exxon Enterprises, parent of EOS, with stealing trade secrets.

Life may get a little cruder this year.

59

M/A-COM

South Ave.
Burlington, MA 01803
(617) 272-9600

Reorganization was the news at this mini-conglomerate last year. M/A-COM's 21 operating companies were consolidated into eight operating divisions. The company sold its optical fiber cable business and its microwave point-to-point business. And Richard T. DiBona posted yet another title on his door: he's now billed in the annual report as "chairman of the board of directors, president, and chief executive officer."

Inspiration for these moves is evident in M/A-COM's numbers, none of them terribly cheerful, especially for a company that's grown used to mammoth annual jumps in both sales and profits. Total corporate revenues for calendar 1983 rose just over 7% to \$654.4 million from \$610.9 million, but profits were down slightly, dropping to \$30.3 million from '82's \$30.8 million. DATAMATION estimates that M/A-COM's dp revenue, all of it earned in data communications, stayed flat at about \$200 million for the year.

Wall Street analysts seem to think the bad news is over. One Texas brokerage told its customers to buy M/A-COM stock, predicting its earnings will jump by 45% this year, based on the economic recovery and on the company's extensive product line.

The last quarter of 1983 seemed to back up the most optimistic forecasts: it was the best first fiscal quarter in the company's history, with sales of \$168.5 million, up 11%, and orders of \$179.2 million, up 28% over the previous year.

More good news came just after the new year when M/A-COM was named program manager, systems architect, and systems integrator of a satellite-based, high-speed facsimile network for Federal Express.

60

PHILIPS INFORMATION SYSTEMS INC.

4040 McEwen Ave.
Dallas, TX 75234
(214) 386-5580

Like many other conglomerates now in the dp business, Philips is confusing to outsiders. The fourth largest electronics firm in the world, with revenues exceeding \$16 billion, it has a worldwide dp presence of about \$1 billion, including \$200 million in 1983 rev-

enues in the U.S. The parent company, Philips N.V., is headquartered in the Netherlands, but it has offshoots everywhere.

U.S. entities, such as Ludwig drums, Sylvania television sets, and Carolina bus routes, are owned by the North American Philips Corp. The parent owns 59% of the stock of this operation, but it is held in escrow at a Connecticut bank. Then there is Philips Kommunikations Industrie AG, a German company 70% owned by the Netherlands Philips, which in turn owns a U.S. dot matrix printer business, Philips Peripherals. Then there is the Canadian based Philips Information Systems Ltd., an OA company with a large U.S. sales subsidiary that had 1983 sales of \$200 million, or about 20% of the estimated total worldwide dp revenues of Philips N.V. and its assorted interests. Philips is included in the DATAMATION 100 on the basis of this subsidiary's revenues.

Last year the Netherlands parent started to consolidate its U.S. operations, with Philips Information Systems, located in Dallas, taking control of the printer business. An intriguing part of the new U.S. operation is its optical disk storage subsidiary, Megadoc, which last year introduced an office equipment version of the consumer video disk system developed by Philips N.V.

61

SANDERS ASSOCIATES

Daniel Webster Highway S.
Nashua, NH 03061
(603) 885-4321

Investors have made a lot of money playing the stocks of this defense contractor and computer graphics specialist. Sanders' 1983 revenues and profits suggest that the news from Nashua will continue to be good. Last year's revenues were up 32%, rising to \$646.5 million from '82's \$487.8 million, and the profit picture was even prettier, with earnings of \$42.6 million, up more than 44%.

Sanders' presence in the dp business dates from 1980 when it bought Calcomp, a builder of computer graphics systems. For the first couple of years, the purchase didn't pay off. The product line was mature and competition was heavy, particularly from Hewlett-Packard. But new products, a profitable arrangement with IBM, and intense cost-cutting are making the picture brighter.

Two new belt-bed plotters, the 945 and the 965, are doing good business, and the graphics terminal Sanders makes for IBM, the 3250, has also sold well as it nears maturity. Sanders is phasing in a new, interactive graphics terminal for IBM, the 5080. Sanders' IBM business accounts for about 13% of sales and 28% of operating profits, leaving it vulnerable to possible IBM in-house production or margin pressure. As has proved true so often before, an IBM imprimatur has meant sales to other vendors as well. For example, shipments of Sanders' Talos digitizer tablet picked up when it was chosen for the 5080.

The improvement in the building business has also meant good things for Sanders: sales of architectural, construction, and engineering end-user graphics devices are running ahead of projections.

62

INFORMATICS GENERAL

21031 Ventura Blvd.
Woodland Hills, CA 91364
(213) 887-9040

Informatics had a mixed year in 1983, with software products performing very well and timesharing services declining. Overall, the company's revenues rose 16% to \$197.9 million, with net income jumping 57% to \$8.5 million. Revenues from dp totaled \$150.5 million, up 17% from 1982. Software products revenues climbed 34% to \$90.8 million, with net income before taxes for those products climbing 49% to \$5.2 million. Timesharing revenues dropped negligibly from \$60.3 million to \$59.7 million, and income before taxes fell 18% to \$3.3 million. While corporate net income jumped, employment grew more slowly, an 8.5% rise to 2,822.

These numbers are a result of Informatics' continued marketing of a range of cross-industry and vertical market products and timesharing services. The cross-industry products, such as the Mark IV and Mark V batch and on-line program development products and the Answer/DB database management system, represent an older, declining portion of the business. Revenues for these types of products and services fell 2% to \$95.1 million, and net income before taxes fell 35% to \$4.4 million. Informatics developed a micro-mainframe connection in conjunction with VisiCorp during the year, providing a gateway to Answer/DB databases from VisiCalc.

The vertical markets areas are booming. Revenues for these products and services hit \$100.4 million, a steep 35% increase over 1982. Income before taxes jumped off the scale, a 121% leap to \$8.2 million. The company's offerings in the accounting, legal, and insurance fields grew 70%, 54%, and 45% respectively during the year.

Even while reaping the rewards of the current generation of vertical market software, Informatics was preparing for the next generation, kicking in \$7.4 million toward R&D in 1983. That represents a 27% increase over the amount spent in 1982 and 4% of 1983 corporate revenues.

63

CPT CORP.

8100 Mitchell Rd.
Eden Prairie, MN 55344
(612) 937-8000

CPT Corp.'s growth in 1983 was less dramatic than in previous years, yet the company did

post gains in both revenues and income. Revenues from its line of office automation equipment were up \$30 million to \$192 million. Net income increased 12% to \$17.7 million.

Even though revenue and income were up, the company categorized FY '83 as "difficult, yet extremely productive," adding it was pleased with its growth despite the weak worldwide economy and the strong U.S. dollar abroad.

To improve its trading position in Europe, the company opened a manufacturing facility in Ireland. CPT says its manufacturing and distribution costs have been lowered since it opened the technical support center in County Cork.

During 1983, the company introduced more new products than in any previous year, but it reports that inventory levels did not increase significantly from 1982. One product it introduced was the Dialog system, a shared intelligence network that allows a large number of workstations to share information. Dialog includes mass storage, database management, teletext, electronic mail, scheduling, and calendaring.

Last April, the company introduced two shared resource systems, the SRS 40 and SRS 65. According to the company, these systems offer cost-effective solutions when central mass storage is required for two to 16 workstations.

CPT says it is stepping up its research and development efforts. Last year the company spent \$9 million, an increase of 34.3% over 1982.

64

DUN & BRADSTREET CORP.

299 Park Ave.
New York, NY 10015
(212) 593-6800

Like many other old-line publishers, Dun & Bradstreet continued its rapid move into the information processing market last year. Fresh from the recent acquisition of McCormack & Dodge, coupled with D&B's computer-related revenues from National CSS, the company's total dp revenues soared in 1983. Much of the success was due to M&D's mainframe software products.

The company reports that dp revenues exceeded \$177 million, up 40% from the \$132 million recorded in 1982 (after subtracting the 4% of revenues derived from other parts of the broad-based supplier of business information services.) The parent company had 1983 revenues of \$1.6 billion and net income of \$167 million, up 11% and 18%, respectively.

Other parts of D&B's dp-related business didn't fare as well. The company reported that NCSS, now known as D&B Computing Services, "suffered a decline in revenue, reflecting industry-wide contraction in the timesharing business." Competition from inexpensive micros was cited by the company

for the decline. In response, D&B Computing cut its overhead and introduced some new products.

DunsPlus was unveiled as the alternative to the user-surly nature of most micro-to-mainframe and micro-to-database links. The company became a value-added remarketer of the IBM PC and the 1-2-3 integrated software package from Lotus Development Corp., and together with D&B databases and other software, created the "most user-friendly system in existence," the company claims.

M&D's recently introduced Millennium series of mainframe software packages for payroll and accounting did well in the market, and the company announced its Interactive pc link for uploading and downloading mainframe and pc data.

65

DYSAN CORP.

5201 Patrick Henry Drive
Santa Clara, CA 95050
(408) 988-3472

Last year Dysan made a lot bigger profit in the stock market than it did in its real business, rigid and floppy disk storage. It sold about 4 million of the shares it held in Seagate and realized a net gain of \$41.22 million. After the sale, Dysan still owns 13% of Seagate, about the same size as the chunk it sold. It is a vivid reminder of how much a smart investment can appreciate in an industry like dp: all of Dysan's Seagate shares had cost it only \$450,000.

Meanwhile, back at Dysan's disk business, news was okay but not thrilling. While revenues for the year were up more than 27% to \$180 million, profits—discounting the enormous contribution from the Seagate sale—were off from 1982's \$9 million.

President and ceo William L. Harry said the windfall from the Seagate deal will be used to finance the further expansion of Dysan's "disk business and the activities of our seedling affiliates."

Indeed, expansion seems to be what Dysan is up to these days. Abroad, the company opened a software duplication and translation facility in Belgium, a distribution center in the U.K., and a new sales office in West Germany. At home, the company says, "We currently have two additional facilities under construction in Santa Clara and are planning to build two manufacturing facilities on our property in Colorado Springs, Colo."

This growth doesn't come cheap. Nor does the R&D that's required to stay ahead of the pack, and Dysan is expected to continue spending between 15% and 20% of its revenues on R&D.

While revenues will undoubtedly rise in the growing—by 30% annually—disk market, it's expected that Dysan's profits won't begin to show the same improvement for a couple of years.

66

INTEL CORP.

3065 Bowers Ave.
Santa Clara, CA 95051
(408) 987-5090

The year 1983 marked two firsts for Intel Corp. It was the first time total corporate revenues exceeded the billion dollar mark and the first time this company has appeared in the DATAMATION 100.

While total corporate revenues registered \$1.12 billion, up from almost \$900 million in 1982, total dp revenues were also up \$35 million to \$175 million. Peripherals and terminal revenues were \$125 million, and software and services revenues made up the additional \$50 million.

The economic recovery reached Intel by midyear, and the company was able to start phasing out the pay cut and freeze that had been in effect since January 1983.

As the demand for Intel's chips soared, corporate annual revenues grew by 25% and operating profits increased nearly fivefold from the company's depressed 1982 levels. In addition, interest income increased by over \$28 million, resulting in net income increasing nearly fourfold and earnings per share more than tripling to \$1.05. In the fourth quarter, revenue was up 39% over the previous year.

But such a strong and positive change in business conditions did bring problems for the company. Part of the growing pains had to do with difficulties in producing product fast enough to meet demand. To counter this, the company's work force and facilities are being expanded.

During the year, Intel introduced the Systems 86/310 and 286/310, single-board processors based on its 8086 and 80286 microprocessors, and the iSBc 186/51, a single-board computer offering both the computing power of the 80186 and the local area network control capability of the 82586. Also new was the Xenix operating system for the 80286 microprocessor, and the company announced that a version of the Unix System V operating system would be available for the 286 in 1984.

67

CONTINENTAL TELECOM INC.

245 Perimeter Center Parkway
Atlanta, GA 30346
(404) 391-8000

Contel didn't wait until Jan. 1, 1984 for the breakup of AT&T. Back in 1978, the company realized big changes were ahead for the telephone industry and it began diversifying into other industries. Contel made a number of acquisitions in the data processing industry that added to the company coffers in 1983. Out of the total corporate revenues of \$2.1

billion, only \$174.7 million comes from dp, but Contel is happy with the profit margins, and is introducing a number of new products for the industry.

Cado, acquired in 1983, was responsible for \$53.5 million in dp sales, up from the \$33.7 million of 1982. Cado's profits weren't individually released. But Contel claims office automation vendor Cado has gone from a loss to a profit. During the year, Cado introduced the Tiger family of multi-processor 16-bit supermicros, which can handle 64 users. Contel expanded Cado's manufacturing facilities—as well as beefing up R&D—with two new manufacturing facilities in 1983, one in Torrance, Calif., and the other in Cork, Ireland.

Other Contel acquisitions in the dp market include STSC Inc., the large supplier of remote services and software products, and NaBanco, a credit card-checking company in the remote processing services market. In addition, International Computing Co. and Network Analysis Corp. were acquired and joined together to form Contel Information Systems. These various software operations added up to \$105.3 million in revenues for 1983.

A new dp revenue producer is expected next year, when Executone, purchased in 1978 by Contel as the first step to diversification, produces a planned line of digital PBX systems for the small business market. Executone is already a prime supplier of telephone gear, with \$178 million in 1983 sales.

Contel is proud of the fact that 31% of its total revenues and 10% of net income come from nontelephone operations. The company plans to expand these figures even further, toward its goal of 35% of revenues and 25% of earnings.

As the telephone industry remains in turmoil, Contel is able to post higher earnings and still keep an eye on what the FCC is proposing to do about access charges. While the 10% earnings appear small, they loom large when compared with Contel telephone operations earnings, which grew only 2.5%. The nontelephone operations are already an important factor for Contel, one the company will no doubt support and nurture.

68

CRAY RESEARCH INC.

608 Second Ave. South
Minneapolis, MN 55402
(612) 333-5889

Cray Research set company records for system deliveries, revenue, and earnings in 1983. Revenues for the year hit \$169.7 million. Net earnings grew 37% to \$26.1 million.

During the year, the firm installed 16 new systems worldwide, bringing the number of its supercomputers in operation to 65. Of the 16 systems, six were Cray X-MPs. By the end of 1983, Cray was shipping one X-MP a month. The company says the X-MP, which

carries a price tag in excess of \$10 million, has become the "financial engine of the company."

During 1983, Cray received orders for 25 systems. Of the 25 contracts, 12 were from new customers, and 10 of those were commercial accounts. Almost half are first-time supercomputer users. Of the remaining 13 contracts signed by existing customers, nine are for the X-MP.

Research expenditures declined \$3.2 million to \$25.5 million—roughly the same percentage of the total budget the company spent on R&D in 1982—despite challenges from national programs in Europe and Japan that are developing large-scale computers and the technology to support them. Furthermore, cooperative programs and consortia have been established in Europe and the U.S. to develop supercomputers, and new companies are entering the field regularly.

To counter these supercomputer challenges, Seymour Cray and his design team produced their first gallium arsenide devices at the company's new fabrication facility in Chippewa Falls, Wis. Cray's other developments were in the software area. The company released a new version of its COS operating system and selected Unix as the operating system for the Cray-2.

69

TELEVIDEO SYSTEMS INC.

550 E. Brokaw Road
San Jose, CA 95131
(408) 993-1320

TeleVideo had a great year in 1983; it increased revenues 71% to \$168.7 million, up from \$98.5 million in 1982. In addition, TeleVideo had a whopping earnings increase as well, which few Top 100 companies were able to match. Earnings were up 76% to \$22.4 million, from \$12.7 million for the previous period.

TeleVideo was able to post these all-time high earnings and revenues figures at the same time that it was broadening its traditional marketplace and entering a whole new market. At the end of 1982, TeleVideo was a leader in the terminal market, but by the end of 1983, it was a force to be reckoned with in the pc market through its TS 800 workstation and TS 804 multi-user system.

In the middle of the year, TeleVideo changed from the operating system CPM standard to IBM's PC DOS, which it recognized early on as the standard operating system for pcs. This enabled the company to grab a large volume of sales through an all-important connection with Computerland.

TeleVideo financed this growth with an initial public offering in early 1983, netting \$91 million. The year saw the number of employees grow 77% to 867. Research and development was a high-priority item, growing 123% to \$6.9 million. A number of steps were taken to expand capacity during the year, including the purchase of a plant in

Korea for pc manufacturing.

Dr. K. Philip Hwang, chairman, has an eye for the future, including smart telephones and other data retrieval devices for the executive's desktop.

70

BASF SYSTEMS CORP.

Crosby Drive
Bedford, MA 01700
(617) 271-4000

The company that invented magnetic tape in 1934 continues to be a leader 50 years later. BASF pulled in \$165 million from magnetic media in 1983, according to DATAMATION estimates. BASF markets a full line of media for large and small systems, including disk packs, cartridges, and computer tape for mainframes and minis, as well as floppy disks and tape cartridges for smaller systems.

The company has increased its emphasis on using resellers rather than dealing directly with even large customers. Currently, more than 50% of all the company's magnetic media products are sold through its authorized reseller network.

BASF's products are manufactured in three facilities around the world. The U.S. headquarters in Bedford uses specialized quality control procedures to ensure product uniformity and performance. The \$16 billion corporation spends about \$200 million a year on research and development in magnetic media, most of which goes into the dp industry (Some goes into audio- and videocassettes and tapes for consumer and entertainment industry use.)

BASF's primary dp business is still magnetic tape. It currently sells two lines, the Endura and the 2000 AD. The 2000 AD line is essentially a premium quality Endura, selected only from custom lots and certified reel by reel to be error-free at 75% higher tolerances than tape drive requirements. The disk business, especially the FlexyDisk floppy disk segment, has been growing rapidly in the past few years, owing to the rise of micros.

71

CENTRONICS DATA COMPUTER CORP.

One Wall St.
Hudson, NH 03051
(603) 883-0111

This well-established printer company found 1983 a disappointing year, despite having reduced substantially its operating losses and repositioning itself to address broader markets. Centronics made efforts to reassert itself in the oem markets, particularly for low-end matrix printers, where it has lost much ground in recent years.

Centronics' sales for 1983 were \$164.1 million on which the firm reported a loss of \$7.7 million. The previous year's loss

had been \$32.3 million from revenues of \$138.4 million. The firm attributed much of the poor showing in 1983 to high costs. To rectify matters, Centronics last year established a new centralized management structure, began investigating the procurement of subassemblies in the Far East, where labor and materials are cheaper, and began redesigning its own manufacturing facilities to take advantage of automated techniques. It also reduced employment to 1,700 from 2,000 people.

Centronics also introduced new models of its Linewriter band printer family and unveiled a new series of low-cost matrix printers, the Horizon line. The former is aimed at oem customers that tend to make lengthy evaluations of products and therefore are slow to make commitments to large volumes. The Horizon line is aimed at small systems and personal computer applications and complements the firm's Printstation line of matrix machines. In both arenas, however, the company faces stiff competition from Japanese and other foreign suppliers. Centronics has, though, continued its relationship with Japanese manufacturer Brother Industries Ltd.

72 **CONVERGENT TECHNOLOGIES INC.** 2500 Augustine Drive Santa Clara, CA 95051 (408) 727-8830

Despite the fact that Convergent Technologies' sales increased \$70 million in 1983 to \$163.5 million, operating income decreased to \$11.9 million from \$18.2 million in 1982.

The company attributed the decrease in income to a general pricing decline in the workstation market and the price reductions of its AWS and IWS workstations during the second half of 1983.

While sales were up for the entire year, sales growth slowed because there were fewer orders than expected from the company's larger oems. They reduced purchases of the AWS and IWS products during the second half of the year in anticipation of CT's new workstation, the N-Gen.

Last year also saw CT stray from its original niche as a manufacturer of desktop computers and roll out MegaFrame, a processor that can be upgraded from an eight- to a 128-user superminicomputer. By the end of the year, orders for the MegaFrame were ahead of company projections. Another new product was WorkSlate, a lap computer.

CT began shipping limited quantities of N-Gen, but shipments of the product were below expectations and costs higher because of a slow manufacturing start-up and an inability to obtain parts from Intel.

A significant event that occurred in the final days of 1983 was the announcement that AT&T Information Systems had awarded CT a contract to design, develop, and manu-

facture certain products in the wake of the communication-giant's decision to enter the general purpose computing arena.

73 **DIEBOLD INC.** 818 Mulberry Rd. S.E. Canton, OH 44711 (216) 489-4000

"Easy Money" ought to be the motto for this company, which at one time was run by Eliot Ness of *The Untouchables* fame. The 125-year-old company is the largest builder and seller of automated teller machines, with more than 6,000 units shipped last year, or almost half of total U.S. shipments. The cash machines have proved to be a boon to banks, brokers, gas station operators, and other retailers. Diebold's revenues, profits, and operating ratios are at the peak of their form, despite competition from archrival Docutel as well as from IBM, NCR, Burroughs, and a host of other computer companies.

Total revenues were up 4% to \$446 million, and net income jumped 18% to \$49.1 million. DATAMATION estimates dp revenues were up a modest 6.7% to \$160 million, representing the revenues from its ATMs, which are really peripherals attached to a bank's mainframes.

To keep on top, Diebold boosted research and development spending 76% to \$24 million, most of it going to hardware and software development to keep its line of teller equipment, both automated and manual systems, state of the art.

Diebold rolled out several new products late last year to encourage its customers to replace units as the ATM market matures. The new ATMs are geared for self-service locations in supermarkets and other retail locations. A new desktop microcomputer line was also introduced to broaden Diebold's profile in the bank automation business.

Diebold as a company was stunned by the sudden death in February of this year of its president and ceo, Earl F. Wearstler, after a short bout with heart disease. He had been a 37-year veteran of the company and had only recently attained the ceo title. In early 1984, Robert Mahoney was named president.

74 **THE SIGNAL COS.** 11255 North Torrey Pines Rd. La Jolla, CA. 92037 (619) 457-3555

Most of Signal's \$160 million in data processing revenues comes from its Ampex Corp. subsidiary in Redwood City, Calif. While Ampex's main business is manufacturing videotape recording equipment and media, its Computer Products Division also supplies crt terminals, core and semiconductor memory systems, and Winchester disk drives

and related media.

While Signal's revenues for 1983 were recorded as \$6.15 billion, up from \$3.73 billion, most of this growth was due to the 1983 merger with Wheelabrator-Frye and to an accounting change. Net income from the merged entity dropped to \$103 million from 1982's \$113 million. DATAMATION estimates that total dp-related revenues dropped to \$160 million from \$177.3 million.

Last year saw Ampex begin full-scale production of Winchester disk drives ranging in capacity from 6.7MB to 27MB, and an increase in shipments of fixed-removable disk drives in the 165MB to 330MB range. The company installed a new automated thin-film disk platter production line that is expected to turn out more than 1 million oem units this year.

Meanwhile, Ampex's crt terminal business, with manufacturing based in Taiwan, expanded its product line with a low-priced family and a series of multiprotocol workstations developed by ECS Microsystems, which was acquired in 1983. The Computer Products Division also hired a new general manager last year, who it hopes will help the company reverse its sales slide.

75 **GERBER SCIENTIFIC INC.** 83 Gerber Road West South Windsor, CT 06074 (203) 644-1551

As the U.S. economy picked up, so did Gerber Scientific's fortunes. The company, which is a specialist in CAD/CAM production, had a hard time in 1982 when the economy soured. But as the economic clouds cleared, Gerber was able to post increased revenues and earnings. Revenues increased 38.7% to \$159.1 million in calendar 1983, up from \$114.7 million for the previous period. Net income was up a spectacular 222% to \$11.3 million from \$3.5 million in 1982.

The CAD/CAM market is set for explosive growth and is expected to become a \$4 billion market by 1986. Gerber is uniquely poised to make the most of this growth. The company is divided into four operating subsidiaries, each geared toward a particular market. In addition, Gerber established a venture capital subsidiary during 1983 to help it invest in emerging companies.

The largest operating subsidiary is GSI, aimed at the electronics and graphic arts industries. The mainstay of this subsidiary is the PC-800 model 13, which aids in the design of printed circuit artwork and the manufacturing of tooling and documentation. Another GSI product is the task-oriented AutoPrep 5000, developed to meet the graphic arts industry's need for fast response and high quality.

Gerber's main effort in the CAD/CAM market has been with its GGT subsidiary, which specializes in the designing, grading, and cutting of flexible materials from fabrics to composites at high speed with great accu-

racy. The backbone of this operation is the GERBERcutter, which has increased production 300% at some locations.

76 MARTIN MARIETTA CORP.

6303 Ivy Lane
Greenbelt, MD 20770
(301) 982-6500

Martin Marietta knew it had a good thing in its Data Systems Division. It was such a good thing that the giant conglomerate decided to spin it off into a separate operation—Martin Marietta Data Systems (MMDS)—four years ago. Attesting to that success is MMDS's data processing revenues, which reached \$154 million, a 23% jump over last year.

Most of that revenue stems from the software side, where MMDS pulled in \$116 million, a 35% increase over 1982. The company offers timesharing services and a range of off-the-shelf and customized software. Particularly strong in the application software area, MMDS markets the popular MAS (Modular Application Systems) software, which has gone over big in the manufacturing industry.

To bolster this software strength, Martin Marietta acquired Mathematica Inc. last year for \$30.8 million plus securities. The software house, which chalked up a net operating revenue of \$36 million in 1982, was melded into the MMDS operation.

Mathematica was quite a catch for MMDS. The company's RAMIS II is the industry's leading fourth generation language, with over 500 installations. It operates on either IBM or compatible machines, using a variety of operating systems. Mathematica's other operations include Mathtech, which is involved in the development of packaged software and the sale of software-enhanced micros, and Mathematica Policy Research, a market research and consulting group specializing in formulating state lottery systems. Mathematica had a number of suitors, but opted for the MMDS offer because of the broad financial base it offered.

Also in 1983, MMDS bought American Management Systems' suburban Washington data center. The company now has three data centers in operation. Setting its sights on the future, MMDS is currently experimenting with new teleconferencing techniques, optical memory, fiber optic networking, large-scale database integration, and robotic simulation.

77 QUOTRON SYSTEMS INC.

5454 Beethoven St.
Los Angeles, CA 90066
(213) 827-4600

Quotron's terminals can be found in the offices of most money managers and Wall Street research analysts, scrolling the latest

stock quotes and investment information. The omnipresence of Quotron in the instant financial data market combined with high volume on the nation's trading floors has meant continuing growth for this company.

Last year, Quotron's revenues increased by just over 27% to \$153.8 million, and net income rose by 41% to \$23.98 million. Also increasing was the number of employees, to 1,425 from 1,164 in 1982. But Quotron's hold on its markets is being threatened. Big customer Merrill Lynch—accounting for about 25% of Quotron's current revenues—is developing its own system with Monchik-Weber. It will use IBM 3270 PCs as terminals, allowing Merrill Lynch customers to call up quotes on their own machines.

Increased competition is also coming from the other data services, ADP and Allied Corp.'s Bunker-Ramo Information Services. Observers say that Quotron's future growth will come in the banking and thrift industries, shielding the company somewhat from the effects of any Merrill Lynch action. Nevertheless, investors have proved wary: while it still sells at a hefty price/earnings ratio, Quotron's stock has not recently approached the high of 32 it posted last summer.

To further counter these threats, Quotron has turned up the R&D flame. In 1983 it spent \$10.8 million, up from \$7.3 million the year before. Some of this money was spent on a new line of products, Quotron 1000, that will deliver a rich menu of office automation features as well as financial data.

For the latest on this company, keep your eye on the screen of one of its own products.

78 WYLY CORP.

UCC Tower
Exchange Park
Dallas, TX 75235
(214) 353-7100

One of the staples of recent business journalism has been the story noting the recovery of this services, software, and turnkey system vendor.

Following a string of disappointing years that included a bankruptcy in 1976, and after a glum 1982 for which the company posted losses of \$7.8 million on sales of \$140.5 million, Wyly actually earned some money in 1983. Not much to speak of, but enough to suggest to the financial community that the new management installed in 1983 might finally get this company shaped up: about \$200,000 on revenues of \$153 million.

The company put some new software on its menu, closed some unprofitable operations, cut costs, and—as *Value Line* reported—"spruced up the balance sheet."

Problems continue, however. Wyly's computer services operation in the United Kingdom remains awash in troubles, and Digital Systems in Florida hasn't performed as hoped.

The improving news includes a big chunk of cash on hand, the result of more money recently kicked in by the company's largest stockholder, the Swiss-based Careal Holding, and the successful sale of 2 million shares of common stock in April 1983. Wyly will use this \$40 million kitty to expand its software offerings through beefed up R&D—almost doubled in '83 to \$9.9 million—and by acquisition.

In September, Wyly bought Open Systems Inc. for \$15.5 million. The Minneapolis-based firm writes accounting software for microcomputers, further strengthening Wyly's hand in its bid to be an across-the-board dealer of financial and accounting wares.

If things keep on improving Wyly can use its own improved performance to advertise the goods.

79 ALLIED CORP.

Columbia Rd. and Park Ave.
Morristown, NJ 07960
(201) 455-2000

Buried beneath the \$10 billion in Allied's annual revenues are several computer businesses, though the crush of natural resources and basic manufacturing operations tend to hide the fact. Several years ago Allied bought Bunker Ramo, a dp hardware, software, and services vendor that has been falling on hard times. DATAMATION estimates that total dp revenues were up slightly in 1983, to \$152 million from the \$147 million of the prior year. According to Allied, BR's operations were "marginally profitable" last year, not much to say for a business that cost Allied \$347 million in 1981.

Any disappointments that BR management felt last year were due to the rapid technological changes taking place in the financial services industry as well as those in the dp worlds.

BR's basic businesses—terminal hardware and software for banks and brokerage firms—were buffeted by the trend to replace dumb terminals like the aging BR line with personal computers. BR tried to stay competitive but its new workstations just didn't provide the IBM PC capabilities and features that end users wanted.

The on-line information business, stock quotes and the like, that BR supplies to brokerage firms also changed from a leisurely business to a cutthroat arena. GTE sold out to ADP, and Quotron was threatened with the loss of its biggest customer, Merrill Lynch.

BR's moves to prepare for the future included increased spending on research and development and a joint venture with Fortune Systems, a Silicon Valley firm with an advanced personal computer. Fortune's fortunes faded fast, however, when the software for its 32:16 workstation proved unreliable. Allied has gone back to the drawing board, looking for a quick fix to its pc needs.

80

VERBATIM CORP.

323 Soquel Way
Sunnyvale, CA 94086
(408) 245-4400

Verbatim ended 1983 on a profitable but cautious note. Revenues were up 45% to \$147 million from the \$98.6 million reported a year earlier. Earnings also increased rapidly, to \$15 million from the \$11.5 million of 1982. These figures, however, hide the dismal performance in the fourth quarter of 1983: earnings fell 25% from last year's \$2.8 million. Verbatim explained the poor performance on order softness from oem customers and a large product return from a major oem customer.

All during 1983, Verbatim battled such problems, but this versatile producer of floppy disks managed to prevail. The competition in the disk market became tougher, and Verbatim moved on a number of fronts to increase its market share. First of all, to round out its product line, Verbatim introduced its Optima series, which is used on high-performance micros like Apple's Lisa.

Verbatim then moved its products into the consumer market by signing 2,000 national chains like Computerland and Macy's. In addition, Verbatim increased its advertising budget and appeared in consumer publications like *Time* and *Cosmopolitan*.

Another Verbatim effort at the consumer market was the introduction of the Disk Drive Analyzer, which evaluates drive head media positioning, drive hub clamping operation, drive speed, and data storage accuracy. This is the first product from Verbatim's Data Encore subsidiary, which is exploring the software duplication market for future products and profits.

Verbatim realized that with success comes competition, and in response pushed its R&D budget up almost 50% to \$11.5 million. Meanwhile, Verbatim is cutting corners in other areas, like layoffs of production workers, to control costs. With personal computer sales continuing their sizzling pace, the lean, mean Verbatim is ready to fight for the flow of user dollars.

81

MANAGEMENT SCIENCE AMERICA INC.

3445 Peachtree Rd. N.E.
Atlanta, GA 30326
(404) 239-2000

In the last few years, MSA has blossomed from a mainframe-focused, privately held company into a software-for-everything, sweetheart of the stock markets. But last year, as they say in Wall Street, MSA didn't "make its numbers," and the stock took a drubbing in a down market.

Nevertheless, MSA's sales jumped last

year by more than 44% to \$145.2 million. (Over the past two years, the increase has been more like 100%.) Income before taxes hit \$19.5 million, up 38% over 1982, and net income grew to \$10.5 million. The increase in net income was held to a respectable 17% by what the company called a "substantially higher" tax rate, caused by MSA's decision to treat R&D tax credits conservatively.

The overpriced dollar abroad was also a brake on MSA's momentum: the percentage of MSA's revenues that came from foreign sources dropped from 23% in 1982 to just under 21% last year. MSA continued to add products to its lineup by acquiring companies. It entered the educational micro software field, a market that's expected to grow by 70% a year in the near future, when it bought EduWare Services Inc. MSA's purchase of Computeristics Inc. added still more items to the company's menu of IBM mainframe software.

MSA also beefed up its R&D budget in '83, pushing it to \$28.9 million, up from \$21.8 million in 1982, continuing a trend set the year before when this seed-money budget item also rose by about a third. With R&D costs running at about 20% of gross revenues, MSA seems determined to further reduce its dependence on the unpredictable fourth quarter payoff that results from relying on financial software as its core business.

82

REYNOLDS & REYNOLDS

800 Germantown St.
Dayton, OH 45407
(513) 443-2000

Last year, this venerable company's revenues moved out of the slot where the recession parked them a couple of years ago. DATAMATION estimates that dp revenues grew last year by about 24%, going from \$120 million to \$145 million. (Reynolds & Reynolds' total revenues, \$263.9 million, include its sales of standard and custom business forms, which first led it into the computer services field.)

Most of Reynolds & Reynolds' business has come from the nation's automobile dealers, among the businesses hardest hit by the recent recession. The recovery has been kind to the diminished car business, and by the fourth quarter of 1983, revenues and gross profits from the computer systems division were up by about one third over the fourth quarter of the year before.

Last year also saw the inking of a joint venture pact in Europe with the French Sligos S.A., Paris. Sligos & Reynolds S.A. will sell computer systems to French automobile dealers. Reynolds & Reynolds is also doing business in Australia, New Zealand, the U.K., and South Africa.

In April, the company closed down development of a specialized contractor system, saying that "to continue development of the system in the face of a closing market window would be imprudent." But by the end of the year, management was optimistic

about tests of a new medical system, and planned to introduce it in 1984.

The company got itself out of the computer-building business in 1983, dropping its E-6000 and replacing its TC 1000 micro terminal with the IBM PC. Early in '84, chairman and veteran ceo E.F. Strasser stepped down in favor of Terry D. Carder, who had been president and ceo. Strasser, who said ill health forced the move, will remain as chairman and consultant.

83

NIXDORF COMPUTER CORP.

300 Third Ave.
Waltham, MA 02154
(617) 890-3600

Revenues for the American arm of Heinz Nixdorf's computer company stayed pretty flat for '83, with sales totaling \$141.1 million, just \$1.1 million more than the previous year. The parent company, headquartered in Paderborn, West Germany, came closer to piercing the \$1 billion ceiling, with revenues up to \$997 million from '82's \$961 million.

The mainstay of Nixdorf's business continues to be its 600 product line, launched more than 10 years ago. But buoyed by a 29% boost in R&D spending, the company sent new products flowing into the U.S. and international markets, among them the 8890 mid-range computer system, aimed primarily at Fortune 500 companies, and the 8860 network system. Last year, a major bond servicing company installed an 8860 system in 110 banks, and more sites are scheduled. Point-of-sale systems for the retail marketplace, particularly hotels and restaurants, are a major target for Nixdorf, and last year the 8812 POS system made its debut, serving a large California restaurant chain.

Two products announced last year will make it into the U.S. market in 1984, the 88BK voice recognition system and the 8832 fault-tolerant computer. The fault-tolerant system was developed with Auragen Systems Corp., Fort Lee, N.J., and will be sold by both companies. Nixdorf claims "almost 100% system availability" for the 8832.

There was big news, too, from Nixdorf's Richmond, Va., software development outfit, Nixdorf Computer Software Co.: a Unix-compatible timesharing system for IBM mainframes running under IBM's DOX/VSE and Nixdorf's own 8890 running EDOS-VS and EDOS-VSE operating systems.

84

NBI INC.

P.O. Box 9001
Boulder, CO 80301
(303) 444-5710

NBI Inc. had a tough year in 1983, a big difference from its performance in 1982. Rev-

venues were up almost \$20 million to \$140.8 million, but income was down almost \$10 million to \$3.5 million.

The company suffered a third quarter loss of \$3.5 million. It attributed the loss to being caught between product cycles as customers delayed orders in anticipation of new NBI systems. Fourth quarter performance began to recover as the demand for its products increased.

During the year, NBI hired 497 new employees bringing its work force to 1,846. It also completed construction on and occupied its new 250,000-square-foot headquarters in Boulder, Colo.

As part of its expansion program, the company opened four new domestic branch offices for a total of 33 and added 15 new dealer locations for a total of 76. NBI also took control of its key international markets by purchasing distribution rights and operations for its products in Canada, West Germany, and the United Kingdom, and built direct sales organizations in those countries as well.

During the year, this vendor added several new products to its OASys line of office automation equipment. Additions included the 4000 series of ergonomic workstations, the OASys laser printer, and the OASys 64 clustered product and 3270 communications capability.

The company also introduced System One, which includes the integrated workstation and integrated systems server. NBI also came out with a local area network that ties the OASys and System product lines together.

85 PLANNING RESEARCH CORP.

1500 Planning Research Drive
McLean, VA 22102
(703) 556-1000

Uncle Sam is a big favorite with Planning Research Corp., which pulled in most of its 1983 dp revenues by doing business with the Feds. Some glitches in that business, however, caused PRC's overall dp revenue to drop slightly to \$136 million last year from \$138 million in 1982.

In the dp domain, software/services jumped 26% to \$131 million. Meanwhile, the company's turnkey systems trade was off by more than 50%, down to \$4.8 million. This diversified services company's total revenues also inched downward to \$318 million last year from \$321 million in 1982.

Data processing remains the company's biggest revenue earner. During FY '83, the PRC Government Information Systems (GIS) operation hauled in 34% (\$108.2 million) of the company's revenues. Approximately 19% came from PRC Systems Services, which posted earnings of \$50.4 million—down 6% from 1982. PRC Computer Systems, which sells computer-based multiple listing and other services to the real estate brokerage industry, accounted for 16%

of the company's overall earnings in FY '83.

On the acquisition front, PRC broadened its dp base last year by acquiring Sterling Systems Inc., an \$18 million computer systems and software company also headquartered in McLean, Va. Officially melded into the GIS group last June, the Sterling Systems subsidiary was a welcome addition to the PRC family. Even more welcome was the \$10 million contract the new sub won to provide software services for the Navy's new inventory control systems.

Also last June, PRC formed an R&D limited partnership with E.F. Hutton called Hutton/PRC Technology Partners Ltd. The 30-year-old company hopes to raise up to \$25 million through this venture to fund high-tech research and development projects.

An in-house venture was also launched last year between the firm's GIS and engineering groups. These two PRC units have teamed up to form a new organization that will market the company's computer-based systems and services internationally. PRC's initial plunge into the international software market failed several years ago.

This time around, PRC is optimistic about profits on the foreign front—optimism that seems to be fueled by the company's accelerating domestic dp drive.

86 LEAR SIEGLER INC.

2850 Ocean Park Blvd.
Santa Monica, CA 90406
(213) 452-6000

Data processing revenues inched up \$2 million for Lear Siegler Inc. in 1983 to \$130 million, according to DATAMATION estimates, despite the fact the company reported record sales of computer terminals.

While shipments from the Data Products Division of LSI, one of the largest independent manufacturers of dumb terminals for non-IBM markets, were at a record level, dollar volume was down because of lower unit prices. In fact, profits almost disappeared due to the industry's rampant price-cutting.

Two new terminals and a printer were introduced in 1983. The terminals are ergonomically designed with detachable keyboards and the monitor has a swivel and tilt mechanism. The multifunctional printer has graphics capability, including full color.

Total corporate revenues were \$1.5 billion in 1983, up from \$1.4 billion in 1982. As the year progressed, business began strengthening for the diversified corporation as reflected in the third-quarter results, which were about even with the previous year. In the fourth quarter, earnings of \$23.8 million represented a 14% improvement over 1982.

Research and development revenues were \$30.9 million in 1983 as compared with \$28.5 million in 1982. According to the company, R&D expenditures are at record levels, and new product development and support of existing products are up companywide.

87 BRADFORD NATIONAL CORP.

67 Broad St.
New York, NY 10004
(212) 530-2400

For better or for worse, 1983 was certainly an active year for Bradford National. The most important events were those concerning the proxy fight waged in the spring by dissident shareholders for control of the company's board of directors. That fight began when William Siegel, ceo of Siegel Oil Co. and a big holder of Bradford stock, formed a group claiming that Bradford was not taking advantage of opportunities in the financial services industry. Bradford sued, then, said it would seek a buyer if Siegel's group would back off. Ultimately, however, Siegel's group held sway. Siegel was named the new chairman of the board and two new directors were named, giving Siegel control of the board, which then named Alan C. Winters to replace Roy B. Simpson as president and ceo.

Through it all, Bradford's business continued to suffer. True, corporate revenues climbed 7% to \$144.4 million and dp revenues rose 10% to \$127.4 million, but the \$400,000 net income for 1982 turned into an \$8.1 million loss. Employment rose 3% to 3,100, and R&D expenses rose 125% to \$4.5 million.

The company continues to focus on providing proprietary services to financial institutions, brokerage firms, and governments. During 1983, its unprofitable Bradford Broker Settlement Inc. subsidiary was sold, which accounted for \$7.4 million of its total loss on the year. The company also sold its 19% interest in Eagles National Corp. at a loss. Without those two transactions, Bradford would have had a \$3.3 million pretax profit on the year.

88 NATIONAL DATA CORP.

One National Data Plaza
Atlanta, GA 30329
(404) 329-8500

National Data Corp.'s dp revenue was up only \$5 million to \$126 million in 1983. While the first and second quarters were ahead of 1982, third and fourth quarter performance fell below last year's level.

Atlantic Richfield, one of NDC's largest accounts for credit card processing equipment, discontinued its credit card and its account, but according to NDC, this had only a "limited impact on overall performance."

Another significant development occurred in July when NDC agreed to acquire Libra Group Inc. of Rockville, Md., for about 270,000 shares of NDC. Libra is a software development and consulting firm whose primary business is in health care-related

government contracts. NDC says this acquisition, if approved, would improve its capacity in the health care market, where it has introduced an on-line eligibility system for health care services.

During the year, NDC introduced the Network for Electronic Transaction Services (NETS) for financial services, which offers banks an integrated package of traditional services and provides them with the opportunity to expand their fee revenue base in corporate, business, and consumer markets.

NDC, appointed by IBM as a value-added distributor for that company's equipment, will introduce treasury bank and pharmacy management systems for the IBM PC.

During the past year, the company made changes in its Rapidata Division by re-directing marketing efforts to concentrate on vertical markets. It also restructured its network services group.

In international markets, Europe continues to be a profit center for the company, and with recent commitments by customers in Japan to install its systems, the company is making inroads in establishing itself in the Far East.

89

RECOGNITION EQUIPMENT

2701 East Grauwyler Rd.
Irving, TX 75061
(214) 579-6000

Last year this supplier of high-speed document and currency processing, data entry and information management systems (using optical and magnetic ink character recognition) cut its R&D budget by \$1.1 million and increased its marketing spending by \$900,000. If salesmen are having more fun than engineers at REI these days, at least the red ink that swept the company in 1982 turned a reassuring black in '83.

Revenues were up only about 4% to \$117 million, from 1982's \$112.4 million. The real news on the financial sheets was a profit of \$9.6 million, a major change from the \$14.2 million loss that 1982 produced.

Reason for the big change? In March of '82, a hot new management team was grafted onto REI's already winning technology base, and last year the hybrid began to bear fruit. Costs were cut throughout the organization. New president William Moore was quick to shed assets and products that didn't fit his tightly focused view of the company's business. Quality control improvements meant each sale cost less to fulfill.

Marketing people were added: the sales and marketing staff is, at 250 people, six times as big as it was when Moore arrived. The service organization was recognized as the sales tool that years of massaging REI's near-custom solutions to customer problems have made it.

One star of the edited product line in '83 was the Tartan Terminal system. The initial piece of an IRS order for the system added

\$2.2 million to REI's '83 numbers, and, if all contract options are exercised—never a sure thing—it could be worth \$14 million. REI also continued to work on its anticounterfeiting labels for consumer goods, signing a \$2.8 million contract to develop a new generation of its successful Signa system.

90

MICOM SYSTEMS INC.

20151 Nordhoff St.
Chatsworth, CA 91311
(213) 998-8844

Micom continued on its steady, steep growth path in 1983. The company racked up \$113.7 million in revenues, a 46% jump over 1982. Net income was also up significantly, a gain of 48% to \$18.3 million from \$12.4 million. Employment jumped 70% to 1,560 from 915, and R&D expenditures nearly doubled, to \$10.3 million from \$5.5 million. In the five years since 1978, revenues have shot up 5,400% and net income has rocketed 14,800%. Not a bad way to celebrate the company's 10th birthday.

All phases of Micom's businesses scored well in 1983. The remote communications products sector, which includes items such as concentrators, protocol converters, modems, and multiplexors, recorded \$53.8 million in revenue, just under half the corporate total. Local area network products, including data PBXs, the Insta series of line drivers and local datasets, and local-cabling, racked up \$33 million through the year.

The LAN segment grew substantially during the year relative to the rest of the company, accounting for 26% of corporate revenues in the first quarter and 31% in the fourth quarter. Part of the growth was due to Micom's acquisition early in the second quarter of Kertec, a Cambridge, Mass., local network cabling concern. The company operates as a subsidiary of Micom and brought in some \$1.6 million during 1983, DATAMATION estimates. Micom sources say the new subsidiary will be renamed Insta-cable but will continue to operate independently.

The success in the LAN segment of Micom's business represents the realization of the company's strategy of penetrating the low end of the local area network market as that niche expands. Yet the success does not come at the expense of either the remote data communications products that were responsible for Micom's initial success in the past decade or the Black Box Catalog, a subsidiary mail order retailer of data communications equipment. The Black Box Catalog, which was acquired in 1982, had revenues of \$20.4 million in 1983.

Micom introduced several new products in 1983. Prominent among them is the Micro7400, a protocol converter that provides an IBM gateway for a dozen async terminals or PCs; it fully supports BSC and SNA and lets terminals switch among a pair of IBM hosts or minis.

Micom also introduced its Micro860 concentrator switch, which can connect up to eight Micro800/2 data concentrators. Other products introduced during the year include an X.25 packet assembler/disassembler and a 9.6Kbps pocket dataset.

91

COMPAQ COMPUTER CORP.

12330 Perry Rd.
Houston, TX 77070
(713) 370-7040

Without a doubt, Compaq represents the Cinderella success story of 1983. The company announced its first product, the Compaq Portable Computer, in late 1982, with shipments slated to begin in January 1983. The product caught the imagination of dp users throughout the country, since it was the first portable computer to offer complete compatibility with the IBM Personal Computer. As a result, in its first year as a revenue-generating company, Compaq pulled in \$111.2 million in revenues, resulting in \$4.7 million in net income. The payroll grew equally, from 96 employees in December 1982 to 614 at the end of 1983. Not bad for beginners.

But Compaq's story, unlike Cinderella's, may not turn out as euphoric as it began. Early in 1983, IBM introduced the XT version of its PC, which included a hard disk drive. Compaq was not able to add a hard disk to its line until the late fall, when the Compaq Plus debuted. But in February 1984, IBM struck back with its own portable computer, aimed directly at Compaq. It, however, cannot accommodate a hard disk drive.

Virtually all of Compaq's revenues came from sales of the portable computer (the Plus line was not shipped in 1983). DATAMATION estimates that the company did generate some \$10 million in sales of spare parts and in maintenance services.

Compaq's success in an area where many startups have been tried and few have succeeded stems primarily from its nearly absolute plug compatibility with the IBM PC as much as from its portability. Other vendors, such as Corona Data Systems and Columbia Data Products, introduced their products later and were not able to provide the same level of compatibility as Compaq did. Nonetheless, these and other companies—including IBM—have targeted Compaq in their quest for growth in the portable market, and Compaq will find it difficult to maintain the same growth in 1984 as it experienced in 1983.

92

CANADA SYSTEMS GROUP

2599 Speakman Dr.
Mississauga, Ont. L5K 1B1
(416) 822-5200

Canada Systems Group is Canada's largest computer services company, with a dozen

offices in North America. Its 1983 revenues were \$109.5 million (U.S. dollars), a 10% increase over the \$99.8 million recorded in 1982. Net income in 1983 was \$800,000, erasing a \$5.4 million loss in 1982.

Late in the year, the company was reorganized into groups. The Processing and Professional Services group is responsible for the production aspects of processing centers, network services, I/O services, and professional services. The Financial Services group includes the Banking and Insurance division and the Commercial Marketing division, while the Industry Services group includes other industries.

The company introduced several new services during the year. The Corporate Income Tax software for IBM PCs allows tax preparers to process and print tax returns in-house. The Datapharm Rx pharmacy micro system is a turnkey product based on the IBM PC that performs prescription filling, patient profile recording, and third-party billing functions as well as basic accounting for pharmacists. For large systems, CSG introduced the ISF Infocenter support facility to aid end-user computing by providing menu-based inquiry and report writing, graphics, and other business functions.

CSG introduced several on-line databases during the year, including STEPS (simplified text extraction procedures) for on-line access to some 550,000 businesses in Canada through Dun & Bradstreet's Dun's Market Identifier file, and the Canadian Federal Corporations and Directors database, which includes financial and personnel data from 135,000 Canadian companies.

93 COMMERCE CLEARING HOUSE INC.

4025 West Peterson Ave.
Chicago, IL 60646
(315) 583-8500

Commerce Clearing House didn't have a good year in 1983. Revenues were up only 8.1% to \$378.8 million from the \$350.1 million reached in 1982. Net income was affected by CCH's decision to restructure its dp business group, which was reaching for sales in the turnkey business. This restructuring caused a \$15 million write-off, which brought net earnings down 21% to \$24.9 million. CCH had started this business to capitalize on its easy entry into the accounting and law professions, which have long been users of CCH's accounting and legal professional publications.

CCH's dp operations generated revenues of \$109.2 million in calendar 1983, barely up from the \$104.5 million registered in 1982. The bulk of these sales come from tax return processing. The Multi-Tax division offers on-line tax compliance processing and planning services to professional tax return preparers like accountants and lawyers. Most of these revenues are produced during

the first quarter of the year, when the tax rush is on. CCH has yet to find a way of expanding its dp business, and time is running out as competition in the industry becomes more and more intense.

94 CULLINET SOFTWARE

400 Blue Hill Dr.
Westwood, MA 02090
(617) 329-7700

Last year Cullinane Database Systems changed its name to Cullinet Software. What it didn't change was its winning way: revenues vaulted over the century mark to \$108 million, almost 70% over 1982's already healthy numbers. Net income rose to \$15.3 million, up almost 48% from \$8 million the year before.

Aside from its new name, Cullinet's three big announcements last year were IDMS/R, the Information Database, and the Cullinet Personal Computer System. IDMS/R takes what has been Cullinet's flagship database management system, IDMS, and adds the relational capability that dp fashion now decrees. IDMS/R can operate as either a network or a relational database system. The Information Database communicates data from IDMS databases to microcomputer users. The Personal Computer System is a management and decision support package for the IBM PC.

These systems are scheduled for volume shipment this year, but gossip has suggested that problems exist at beta sites for IDMS/R. Cullinet has vigorously denied these reports, and Wall Street analysts have apparently discounted the rumors. For example, Paine Webber has forecast continued 50% revenue growth rates for the next few years.

Still, IDMS/R is not really a new product; it is the enhancement of a veteran winner, IDMS, first introduced by Cullinane in 1973, but based on an even earlier system acquired from B.F. Goodrich. Even so, it is generally agreed that IDMS is better than IBM's DL/I and IMS database systems, and that Cullinet's associated products also have the edge.

Among Cullinet's acquisitions during '83 was Computer Pictures Corp., specialists in management graphics. The convertibility of this software to microcomputers seems to have been a major factor in Cullinet's decision to buy the company.

95 SCHLUMBERGER LTD.

277 Park Ave
New York, NY 10172
(212) 350-9400

Oil industry services giant Schlumberger spent some \$300 million over the past three years buying up several companies in the CAD/CAM business, and last year didn't have

much to show for it. DATAMATION estimates dp revenues increased a mere 7% to \$108 million in 1983. While \$5.8 billion Schlumberger does not disclose the earnings on the \$2 billion worth of individual operations unrelated to oilfields, observers say the return on investment to date does not look like a gusher.

Schlumberger subsidiaries Applicon, Benson, and Manufacturing Data Systems Inc. have been consolidated into a Computer Aided Systems group along with a number of test equipment manufacturers. The company reports that economic activity spurred in the second half, with orders up 36%, yet the enormous success of newer CAD/CAM players like Daisy Systems and Prime Computers is having an effect on Applicon in the \$2.1 billion market.

To stay on top, Applicon introduced the Bravo! system, based on the 32-bit superminicomputer from DEC. It is an integrated system of application and systems software. All the software bells and whistles, like menu-driven instructions, prompts, and help commands throughout, are included.

Schlumberger spent \$339 million last year on R&D and not all of it went to new oilwell thermometers. The company brags about its work on artificial intelligence, and given the resources Applicon has behind it, the little companies in the CAD/CAM market may have to contend with a real breakthrough product someday.

96 DOCUTEL/OLIVETTI CORP.

106 Decker Court, Las Colinas
Irving, TX 75062
(214) 258-8610

Two years ago the outlook for Docutel was bright. It had merged with the U.S. operations of a European office products powerhouse, Olivetti, and had the cash to expand its automated teller machine (ATM) business and simultaneously have access to the hot office products market with Olivetti personal computers, typewriters, and other state-of-the-art products. Business magazines hailed the merger.

So much for their optimism. In 1983 the new Docutel/Olivetti oozed red ink out of every corporate pore. Combined revenues of the Docutel ATMs, its knitwear business, and the Olivetti office equipment line were \$221.8 million, up significantly from the \$147 million of 1982. Profits were nonexistent—the company posted an \$18.3 million loss, with most of it occurring in the fourth quarter and related to its dp operations. DATAMATION estimates revenues were up 6% to \$150 million.

Docutel's first line of personal computers was discontinued and replaced with a line of IBM PC-compatible units in desktop and portable models. Faced with a horde of Japanese electronic typewriters that could more easily be connected to PCs as printers,

the Olivetti Praxis line had to be discounted to attract buyers, and \$10 million in inventory was written off.

Now the horizon is also not clear. Docutel's basic business, its new ATMs, faces an uncertain future as market saturation approaches—most banks already have cash machines. Docutel may not be able to make inroads into new locations, such as supermarkets, when faced with renewed competition from archrival Diebold and new products from IBM and NCR.

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DECISION DATA COMPUTER CORP.

100 Witmer Rd.
Horsham, PA 19044-2282
(215) 674-3300

Peripherals for IBM equipment are central to the success of Decision Data. Last year it shipped about 85% more of its printers and 50% more of its crt workstations than in the year before. The increased size of the company's installed base meant service revenues also rose dramatically. The company also managed to reduce general and administrative expenses to 9% of revenues, from 12% in 1981. Revenues leapt by 40% to \$103.8 mil-

lion, from 1982's \$74.3 million. Despite an unfavorable tax situation, profits kept pace, rising 41% to hit \$5.4 million from 1982's \$3.8 million.

Riding the good news, the company went to the financial markets in March and sold 2.3 million shares of common stock, raising about \$19 million. Management used the new cash to reduce long-term debt to about \$600,000, and to purchase warrants for several million shares held by Data Recording Instruments Ltd. (DRI still owns about 4% of Decision Data's stock, down from about 14%.)

The company forecasts revenues and earnings that "will continue to surpass the 20% annual growth rate" of the industry. To help make its predictions into truths, management signed an offshore manufacturing deal with Tatung Electronics of Taiwan, where it will move the fabrication of some subsystems for its crt workstations.

Also part of Decision Data's growth strategy is a new subsidiary, International Computerized Telemarketing Inc., a software-driven telephone marketing system. The company hopes the new enterprise will reduce Decision Data's total dependence on IBM plug-compatibility for its business.

Other new products shipped in '83 were a 12-inch crt workstation, a letter-quality printer, and a cluster controller.

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PRINTRONIX INC.

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The general malaise in the minicomputer market definitely had an impact on impact printer maker Printronix. During 1983, sales of its best-selling model, the P300, were flat, reflecting the overall trend in the minicomputer market.

At the high end of that market, however, there was good news. The faster super-mini printers inherited from Data Printer Corp. made a valuable contribution to sales growth in 1983. In fact, the company's dp revenue jumped 31% to \$101.3 million, beating the 1982 growth gain of 28%. Earnings were also up 24% to \$6.8 million, double the increase for 1982.

The 10-year-old printer manufacturer clearly made a smart move in buying Data Printer, the Malden, Mass., maker of high-speed band and chain-train printers. Printronix wasted no time in showing off its expanded product line. In May, the same month as the takeover, Printronix turned up at the NCC touting the Model 2000, a 2,000 lpm printer developed by Data Printer.

The Data Printer acquisition filled in a gap in Printronix's product line. Until then, the company had offered its oem customers 150 to 600 lpm printers targeted mainly at the mini. Data Printer's 600 lpm to 2,000 lpm models shifted Printronix into the super-mini and mainframe markets.

Static sales in the mini realm made this move all the more necessary. Printronix had already anticipated this in 1982, when it launched its MVP printer for the small business system and office automation markets. Sales of the MVP last year were lower than expected, however. Retrenching, Printronix moved the MVP into the microcomputer arena last year, tailoring it for micro applications. Also last year, the company came out with the Intelligent Graphics Processor for the MVP printer. Other new products included the "extra quiet" P6000XQ printer and the 4000 series matrix line printer for graphics applications such as CAD/CAM.

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FLOATING POINT SYSTEMS

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Floating Point Systems continued to grow modestly in 1983, with revenues increasing 12.6% to \$100.2 million. Net income rose at a slightly steeper rate, a 14% increase to \$13.1 million. The company makes a wide range of floating point and array processors, and brought out several new models during the year.

Primary among the new product in-



"Forget Miniaturization. I want a B/G computer."

roductions was the FPS 5000 series. Aimed directly at the signal and image processing markets that have dominated the company's user base since 1975, the series consists of six basic product groups that range in performance from 8 to 62 million floating point operations per second. The top-of-the-line 62 MFLOP model costs less than \$100,000. The series uses multiple arithmetic VLSI coprocessor chips directed by a single cpu, permitting modular configurations.

Within the signal and image processing markets, Floating Point's customer base has changed significantly over the past year. Revenues from seismic imaging technology dropped 55%, while sales of medical imaging technology grew 41%. That gain may be short-lived, since General Electric, a big medical systems customer, recently announced it was dropping Floating Point as its primary supplier.

For the simulation market, sales of the FPS-164 scientific computer doubled in volume for the second year in a row. In 1983, that unit accounted for \$19.2 million in sales, compared to \$9.5 million in 1982. Sales into the simulation market grew 64% during the year, when other products were taken into account. The FPS-164 was enhanced during the year with expanded memory capacity and a new FORTRAN compiler. Customer acceptance of the enhancements raised the average selling price per unit from \$300,000 to \$375,000.

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MEAD CORP.
9333 Springboro Pike
Miamisburg, OH 45401
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When Mead Corp. is mentioned, paper products usually come to mind, but Mead Data Central (MDC) is beginning to change this. Mead Corp. ventured into the electronic publishing business in 1970 by investing in a computerized information services division. Off to a slow start, MDC has overcome years of setbacks to become one of the DATAMATION 100, as total revenues increased to \$94.5 million from \$66.2 million in 1982.

Internal conflicts, including managerial turnover, inadequate financial backing, and questions of confidence in MDC's new product created a disturbing background to the introduction of on-line data services a decade ago. Also, Mead's computerized legal research service, LEXIS, received disheartening reviews at its debut in 1973. LEXIS has arrived before its time—lawyers were unwilling to be pioneers in the computer field. Later, when LEXIS appeared in law schools, students there found it a valuable service; once established in law firms, these former students brought with them a regard for LEXIS, and revenues began to increase. But the story doesn't end here.

Mead Data and its parent company continued to battle over finances. Allocation of corporate development funds to its divisions was a concern. Then, in 1977, when LEXIS began to show a profit, this money was not funneled back to MDC but was invested in unsuccessful Mead Corp. projects.

Finally, in 1980, there was a new addition to the MDC family—NEXIS. A general information on-line database service, NEXIS had a more promising forecast than did LEXIS at its inception. Though expensive to use—\$50 a month plus \$20 an hour for connect time, a telecommunications charge ranging from \$8 to \$12 an hour, and search charges of up to \$18 during peak hours—NEXIS is still expected to show a profit this year.

Because of its abundance of information, MDC is surpassing the competition both in revenues and size (it has the largest on-line full-text database). Though net income and R&D expenditures were not disclosed by Mead, the future seems promising for this computer-assisted research company. An electronic clipping service (ECLIPSE) is now available for LEXIS and NEXIS users who need to be informed of current trends or get timely information on a specific subject. In an effort to broaden its market, MDC's database will be offered on IBM hardware.

A paper company's shaky venture into the legal information service field has produced one of the largest electronic information retrieval services available today. ■

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couldn't get a
document from
our computer to
our word
processor."**

"Before Soft-Switch,TM that is."

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"It's simple to install and doesn't need much maintenance. The staff likes it because it's easy to use, requires very little training, and just about eliminates document back-up.

"Soft-Switch supports both MVS and VM/CMS operating systems, and it's the first Document Control System that's fully compatible with IBM's DIA/DCA.

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CIRCLE 81 ON READER CARD



equipment. And if you don't have a mainframe, you can still use Soft-Switch by time-sharing through CISinet Corporation.

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Japan is more friend than foe in the struggle to survive U.S. dp domination.

EUROPE WARMS TO THE RISING SUN

by Fred Lamond

The European computer industry sees Japan less as a threat and more as a welcome ally in the struggle to survive U.S.—and especially IBM—domination of free-world computer markets. Are the Europeans in fact, deluding themselves and, like Little Red Riding Hood, opening their doors to a wolf that will soon gobble them up? Or, on the contrary, have they shrewdly assessed the situation? Japan's status as friend or foe can best be determined by examining its European product portfolio.

The Japanese computer products currently offered on the European market fall into three main groups—components and peripherals, private label systems, and personal computers. The components, notably semiconductor (RAM) memories and peripherals, are sold on an oem basis to European computer manufacturers and system integrators that incorporate them into their products. The second category of equipment consists of large IBM 370-compatible mainframe processors and systems that are manufactured in Japan but sold in Europe under the labels of U.S. or European-based suppliers. Also sold on European soil are Japanese-built personal computers distributed under their manufacturers' own labels through the usual independent retail outlets.

European manufacturers view the components and private label systems products as survival aids against increasingly fierce U.S. competition. The pcs are not yet seen as any sort of threat in Europe, or in the U.S. for that matter.

Semiconductors are another story. The Japanese VLSI circuit project enabled Japanese semiconductor component manufacturers to overtake U.S. suppliers in certain key areas, notably semiconductor memories. They currently supply the major share of the free world's consumption of 64K RAMs and will be the first to offer 256K RAMs. In fact, Fujitsu already incorporates the 256K RAM in its M16 personal computer.

While these Japanese advances have caused consternation among U.S. semicon-

ductor makers, they haven't made any waves in Europe, which has no independent (European-owned) semiconductor industry worth talking about. Set up in 1978 with government capital, British-owned Inmos produces 64K dynamic RAMs to help the cash flow, but its main hopes rest on its Transputer microprocessor (TM).

European dp manufacturers thus see the Japanese semiconductor industry primarily as a welcome alternative source of components—a source they will use more and more now that the U.S. has slapped reexport restrictions on products incorporating U.S. designed or built components.

Nor can American semiconductor manufacturers claim for much longer that they are the only ones serving European employment needs, for the Japanese are also opening European manufacturing and assembly plants. Fujitsu, for example, manufactures most of the components and subassemblies it supplies to ICL at the Manchester semiconductor plant it bought from the British mainframer as part of its collaborative deal.

PACT HELPS ICL SURVIVE

This pact, signed in the fall of 1981, is widely credited with having ensured ICL's survival as a profitable British-owned computer manufacturer—at least in the mainframe realm. Under the agreement, ICL gets two to three years' advance notice of new circuit generations developed by Fujitsu. This allows the company to get a head start on processor designs based on the new circuits.

As early as 1982 ICL thus was able to start planning a new generation of 2900 series mainframes based on Fujitsu 10,000-gate logical circuit chips. These chips, which will not become generally available until next year, are 14 times more integrated than the 700-gate chips that IBM uses in its current generation of 4300 and 308X series processors. The U.K. company was also able to expedite the design process by using CAD-CAM programs developed by Fujitsu. In addition, it subcontracted with Fujitsu for those

subassemblies that the Japanese firm could build more economically.

Collaboration with Fujitsu will therefore enable ICL to announce the 2 MIPS DM1 this year—six to 12 months before IBM unveils its next generation of 4300 processors. ICL's 7 MIPS Estriel introduction will come shortly after IBM's announcement of the Sierra series, which may use less highly integrated logical circuitry. Without Fujitsu's ICs, it is doubtful whether ICL would have been able to design another generation of 2900 series mainframes capable of competing effectively with the IBM 4300 and 30XX series.

A similar collaborative deal has enabled the German chemical combine BASF to stay at the forefront of magnetic support technology. Ever since it invented the audio tape recorder 50 years ago, BASF has been a natural supplier of high-quality magnetic tape reels and recording disks for the computer industry. Nevertheless, it has no indigenous expertise for manufacturing the drives, which users increasingly order from the same source as the recording media, especially since most drives are furnished as fixed disks.

In the early 1970s, BASF either built its own 3330 and 3350-type disk drives under license from Century Data Systems or imported them directly from the U.S. These drives later suffered from reliability problems. To overcome such problems in the Winchester era, BASF collaborated with Nippon Peripherals Ltd., the disk and tape manufacturing subsidiary jointly owned by Fujitsu and Hitachi.

The Japanese side builds the drives, while the German end supplies the data modules. The final product has satisfied everyone, especially BASF, which has continued to expand its revenues in an increasingly competitive market.

In the oem market for desktop personal computer peripherals, the fight is between pure U.S. and pure Japanese diskette drives, with Sony ranking as the leading Japanese supplier. European vendors regard the Japanese products as more reliable, both in supply and performance. Indeed, the unnerving de-

The Japanese are first-class precision engineers of other people's concepts.

livery delays on U.S. drives sometimes put the sales and survival of some of their smaller oem customers at risk. European pc makers have thus been among the first to embrace the new 3½-inch Sony mini-diskette drive, which appeared on the portable ACT Apricot and several other European makes well before Apple adopted it for its Macintosh and Lisa II series.

At the high end of the market, both Fujitsu and Hitachi supply complete Japanese-built, IBM-compatible processors that carry the labels of their European distributors. While U.S.-based National Advanced Systems was first off the mark in 1979 with large Hitachi-built mainframes (the AS 7000, AS 9000, and more recently the AS 8000 and AS 6600 systems), the same hardware has also been marketed under the BASF and Olivetti labels since 1981. Siemens has sold large Fujitsu processors and complete systems under its label since 1979, while ICL has done the same thing, though not as successfully, since 1982.

There is no European labor content whatsoever in these large Japanese mainframes, which are essentially a cash cow for European distributors. By peddling these products through their existing sales and support networks, European distributors earn a 40% distributor's share of the end-user price.

By rounding out their product lines, the large Japanese mainframes also make it easier for their European distributors to sell their other products to users who prefer to limit their suppliers. On that supplier list are BASF for plug-compatible disks, magnetic tape drives, and printers; ICL and Siemens for small- to medium-size non-IBM-compatible mainframes, communications networks, and intelligent processors; and Olivetti for financial terminals, personal computers, and word processors.

Like the BUNCH companies (Burroughs, Univac, NCR, Control Data, and Honeywell) in the U.S., European mainframers ICL and Siemens find they can sell only their idiosyncratic 2900 and 7.500 series mainframes to their existing customer base, which shrinks a little more each year. This shrinkage is caused by customer defection to the IBM-compatible world, which provides a much larger choice of system and applications software products. By offering IBM-compatible mainframes, ICL and Siemens can both retain the trade of such users and can even counterattack by collecting orders from some traditional IBM users. The Japanese connection thus enables them inexpensively to capitalize on the IBM-compatible trend.

Desktop personal computers are the only Japanese end-user products that appear on the European market under their own labels. NEC, Fujitsu, Hitachi, Mitsubishi, and

FIG. 1

JAPANESE EXPORTS TO WESTERN EUROPE—COMPLETE COMPUTER SYSTEMS¹

	(VALUE IN \$M ²)		(VOLUME IN UNITS ²)	
	1983	1982	1983	1982
Benelux	28.9	10.1	17,800	3,002
France	12.3	8.5	45,988	3,600
Italy	8.9	9.7	15,120	735
Scandinavia	4.5	1.6	8,791	1,858
Spain	1.2	2.6	5,204	718
U.K.	15.5	11.3	31,130	9,630
West Germany	57.3	24.4	45,732	17,211
Others	5.2	3.8	8,450	2,927
TOTAL	133.8	72	198,215	39,661

¹Includes cpus with I/O units

²All figures are for the 11 months through November.

Source: John Aczel

FIG. 2

JAPANESE EXPORTS TO WESTERN EUROPE—CPUS

	(VALUE IN \$M)		(VOLUME IN UNITS)	
	1983	1982	1983	1982
Benelux	0.7	0.4	784	210
France	1.2	1.0	1,875	471
Italy	0.2	0.1	674	65
Scandinavia	2.1	0.4	5,053	202
Spain	1.8	0.6	776	45
U.K.	7.2	0.4	36,375	93
West Germany	17.7	9.8	26,900	10,380
Others	1.3	0.2	1,627	191
TOTAL	32.2	12.9	74,064	11,657

All figures are for the 11 months through November.

Source: John Aczel

FIG. 3

JAPANESE EXPORTS TO WESTERN EUROPE—STORAGE UNITS

	(VALUE IN \$M)		(VOLUME IN UNITS)	
	1983	1982	1983	1982
Benelux	27.3	20.3	21,052	6,431
France	8.1	4.8	33,641	7,617
Italy	4.0	0.9	23,129	5,822
Scandinavia	8.4	3.0	20,846	7,283
Spain	4.4	5.8	2,930	2,360
U.K.	40.2	10.3	368,549	24,351
West Germany	54.5	24.8	391,415	17,234
Others	10.6	4.8	140,751	44,761
TOTAL	157.5	74.7	1,002,313	115,859

All figures are for the 11 months through November.

Source: John Aczel

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CIRCLE 104 ON READER CARD

Japanese propaganda for the fifth generation has stimulated interest in AI and expert systems.

Toshiba sell professional personal computers, while Epson, Sanyo, and Sharp market home computers in Europe.

Like Japanese cameras, tv sets, and stereos, Japanese pcs are well engineered, ergonomic, good-looking, and thoroughly reliable. So why then do European personal computer manufacturers view these rival wares with such smug complacency?

Maybe it's because the fast-moving personal computer market shows up Japan's main limitation in high tech. While the Japanese are first-class precision engineers of other people's concepts, they themselves are not conceptually creative. None of the Japanese pcs break new ground or take the state of personal computing one step further. With the pc, as with other equipment, the Japanese have simply produced a better-engineered, more reliable product to existing de facto industry standards.

These standards, however, are continually changing, and the Japanese are finding it hard to keep up. In 1981, they had just brought out their first CPM-based, 8-bit personal computer models when the European

professional pc market was already moving to 16-bit computers in the wake of IBM's PC announcement.

Late 1983 saw the appearance of such 16-bit machines as the NEC 8800 and the Fujitsu M16. All are single-station systems supporting MS-DOS and CPM-86. In order to offer a compatible growth path from their 8-bit models, the Japanese manufacturers have been getting licenses for Microsoft's MSX, the 8-bit version of the MS-DOS operating system.

But even as the Japanese manufacturers gear up for high production of these systems, the European and U.S. personal computer market has already become more interested in multi-user systems running under Concurrent CPM-86, Xenix, UniPlus, or Pick. Also becoming popular are local area networks linking Xenix-shared file servers with MS-DOS or CPM application processors.

If the professional desktop computer market is evolving too fast for the Japanese, then the home computer market ought to be their oyster, since competitive pressure forces prices down to levels where only low-

cost, high-volume producers can be profitable. Yet even here, Japanese manufacturers like Sanyo and Sharp have found themselves underpriced and outsold by Sinclair, the Freddie Laker of the home computer market.

JAPANESE HAVE JUST FOUND AI

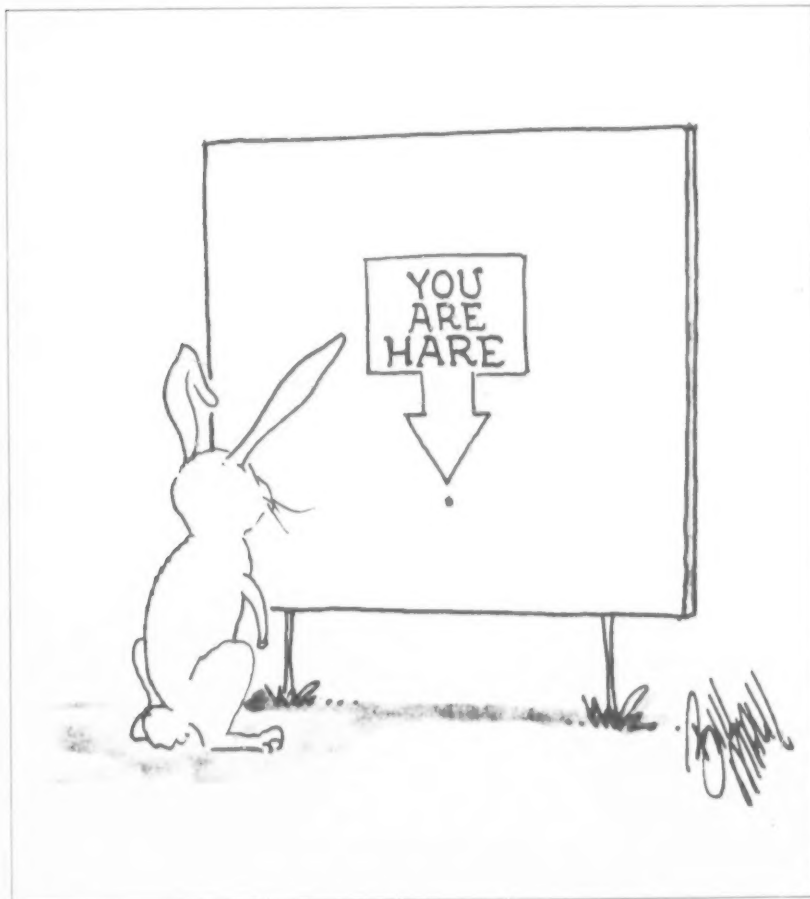
After some initial alarm, the Japanese hullabaloo surrounding the fifth generation is now recognized as an avowal of Japanese weakness in the domain of creative conceptual design. Far from being ahead in expert systems and other artificial intelligence (AI) applications, the Japanese have only just discovered this field in which American, British, and French computer scientists have been laboring for 15 years.

Shorn of stylistic embellishments, the Japanese message at the fifth generation conference they called two years ago can be summarized as, "Let us all—Americans, Europeans, and Japanese—pool our ideas of fifth generation applications at the original research stage" (at which Japanese are notoriously weak). "When the feasible systems have thus been identified, it's every firm for itself in the engineering, production, and marketing of end-user products" (at which Japanese are very good).

Europeans, like Americans, have seen through this ploy, and at government levels, at least, it's no deal. There will be some cooperation on an intercompany basis, as part of the ICL-Fujitsu and Siemens-Fujitsu collaborations, for instance, but little more than that. Instead, European mainframers ICL, Siemens, and Honeywell-Bull have decided to collaborate on AI. (The trio has a new joint research center near Munich.)

What Japanese propaganda for the fifth generation has done, however, is open European government coffers to the academic pioneers of expert systems—researchers who had virtually no funding only a little over two years ago. In fact, few people outside Imperial College in London, Edinburgh University, and the University of Aix-Marseilles had even heard of the Prolog AI programming language developed there, until the Japanese announced that they were adopting it as their standard. Now the Prolog progenitors are receiving the wholehearted backing of their governments to develop the language into a fully supported program product on leading pc, mini, and mainframe models. It will also be groomed as the main rival to the American Lisp.

In stimulating interest in expert systems and artificial intelligence, the Japanese have probably brought forward the widespread applications of these technologies by several years. So it's easy to see why Europe has warmed to the land of the rising sun. ♦



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